1A Ultra Low Dropout Linear Regulator TPS1117LVxx

FEATURES

- Low Ground Pin Current
- Ultra Low Dropout Voltage
- Excellent Line and Load Regulation
- Guaranteed Output Current of 1.0A
- Fixed Output Voltage: 1.0V, 1.2V, 1.5V 1.8V, 2.5V, 2.8V, and 3.3V
- Over Current Protection
- Over Temperature Protection
- Available in SOT-223 Package

SOT-223-3

APPLICATIONS

- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

ORDERING INFORMATION

Device	Package
TPS1117LVxxS	SOT-223-3L

xx: Output Voltage

DESCRIPTION

The TPS1117LVxx series of high performance ultra low dropout linear regulators operates from 2.5V to 5.5V input supply and provides ultra low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TPS1117LVxx is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TPS1117LVxx to operate under extremely low dropout conditions.

Please contact us for more information about this product.

ES France - Département Composants & Modules
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Site Web : www.es-france.com

1A Ultra Low Dropout Linear Regulator TJ4310

FEATURES

- Ultra Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 1A
- Available in SOP8, SOP8-PP, SOT-89-5L, DFN2X3-8L Packages
- Fixed Output: 1.0V, 1.2V, 1.5V, 1.8V, 2.5V, and 3.3V
- VOUT Power OK Signal
- Programmable Soft-Start Function
- Output Auto Discharge Function
- Over-Temperature/Over-Current Protection

APPLICATION

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

DESCRIPTION

The TJ4310 series of high performance ultra-low dropout linear regulators operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TJ4310 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TJ4310 to operate under extremely low dropout conditions.

SOP8 / SOP8-PP

SOT-89-5L

DFN2X3-8L

ORDERING INFORMATION

Device	Package
TJ4310GD-ADJ	SOP8
TJ4310GD-X.X	
TJ4310GDP-ADJ	SOP8-PP
TJ4310GDP-X.X	
TJ4310GF-ADJ	SOT-89-5L
TJ4310GQ-ADJ	DFN2X3-8L

X.X = Output Voltage = 1.0, 1.2, 1.5, 1.8, 2.5, and 3.3

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage (Survival)	V_{IN}	-	6.5	V
Maximum Output Current	I_{MAX}	-	1	A
Lead Temperature (Soldering, 5 sec)	T_{SOL}		260	ºC
Storage Temperature Range	T_{STG}	-65	150	ºC
Operating Junction Temperature Range	T_{JOPR}	-40	125	ºC
Package Thermal Resistance *	$\Theta_{JA\text{-}SOP8\text{-}PP}$	68		ºC/W

* Calculated from package in still air, mounted to 2.6mm X 3.5mm(minimum foot print) 2 layer PCB without thermal vias per JESD51 standards.

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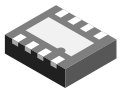
1A Ultra Low Dropout Linear Regulator TPS7A8001

FEATURES

- Ultra-Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 1.0A
- Adjustable Output Voltage up to 4.5V
- Output Auto Discharge Function
- Over-Temperature/ Over-Current Protection
- Available in DFN-3030-8 Package



DFN-3030-8

ORDERING INFORMATION

Device	Package
TPS7A8001Q	DFN-3030-8

APPLICATIONS

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

DESCRIPTION

The TPS7A8001 of high performance ultra-low dropout linear regulator operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TPS7A8001 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TPS7A8001 to operate under extremely low dropout conditions.

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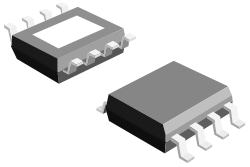
1A Ultra Low Dropout Linear Regulator TJ1801

FEATURES

- Ultra Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 1A
- Available in SOP8-PP Package
- VOUT Power OK Signal
- Programmable Soft-Start Function
- Output Auto Discharge Function
- Over-Temperature / Over-Current Protection

SOP8-PP PKG



ORDERING INFORMATION

Device	Package
TJ1801AGDP-ADJ	SOP8-PP
TJ1801BGDP-ADJ	

APPLICATION

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

DESCRIPTION

The TJ1801 series of high performance ultra-low dropout linear regulators operates from 1.6V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TJ1801 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TJ1801 to operate under extremely low dropout conditions.

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage (Survival)	V_{IN}	-	6.5	V
Maximum Output Current	I_{MAX}	-	1	A
Lead Temperature (Soldering, 5 sec)	T_{SOL}	-	260	ºC
Storage Temperature Range	T_{STG}	-65	150	ºC
Operating Junction Temperature Range	T_{JOPR}	-40	125	ºC
Package Thermal Resistance *	$\Theta_{JA\text{-}SOP8\text{-}PP}$	68		ºC/W

* Calculated from package in still air, mounted to 2.6mm X 3.5mm(minimum foot print) 2 layer PCB without thermal vias per JESD51 standards.

Please contact us for more information about this product.

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1.5A Ultra Low Dropout Linear Regulator LD39150

FEATURES

- Ultra Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 1.5A
- Available in TO-252-5L Package
- Fixed Output: 1.8V, 2.5V, and 3.3V
- Output Auto Discharge Function
- Over-Temperature/ Over-Current Protection

TO-252-5L

APPLICATION

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

ORDERING INFORMATION

Device	Package
LD39150GRS-ADJ	TO-252-5L
LD39150GRS-X.X	

X.X = Output Voltage = 1.8, 2.5, and 3.3

DESCRIPTION

The LD39150 series of high performance ultra-low dropout linear regulators operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The LD39150 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the LD39150 to operate under extremely low dropout conditions.

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage (Survival)	V_{IN}	-	6.5	V
Maximum Output Current	I_{MAX}	-	2	A
Lead Temperature (Soldering, 5 sec)	T_{SOL}		260	ºC
Storage Temperature Range	T_{STG}	-65	150	ºC
Operating Junction Temperature Range	T_{JOPR}	-40	125	ºC
Package Thermal Resistance *	$\Theta_{JA\text{-}TO252\text{-}5L}$	105		ºC/W

* No heat sink / No air flow / No adjacent heat source / 0.066 inch2 copper area. (T_A=25°C)

Please contact us for more information about this product.

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2.0A Low Output Voltage Ultra LDO Regulator TJ2132

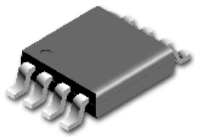
FEATURES

- Input Voltage Range: 1.1V to 3.6V
- Output Voltage Range: 0.6 V to 1.8 V
- Ultra Low Dropout Voltage
- Low Quiescent Current
- Excellent Line and Load Regulation
- Guaranteed Output Current of 2.0A
- V_{OUT} Power OK Signal
- Programmable Soft-Start
- Logic Controlled Shutdown Option
- Over-Temperature/Over-Current Protection
- -40℃ to 125℃ Junction Temperature Range

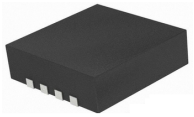
APPLICATION

- Motherboards and Graphic Cards
- Microprocessor and Chipset Power Supplies
- Peripheral Cards
- Low Voltage Digital ICs
- High Efficiency Linear Regulators
- SMPS Post Regulators

SOP8-PP



DFN 3x3-8L



ORDERING INFORMATION

Device	Package
TJ2132GDP	SOP8-PP
TJ2132GQ	DFN 3x3-8L

DESCRIPTION

The TJ2132 is a 2.0A high performance ultra low-dropout linear regulator ideal for powering core voltages of low-power microprocessors. The TJ2132 implements a dual supply configuration allowing for very low output impedance. The TJ2132 requires a bias input supply and a main input supply, allowing for ultra-low input voltages on the main supply rail. The input supply operates from 1.1V to 3.6V and the bias supply requires between 2.7V and 5.5V for proper operation. The output voltage is adjustable from 0.6V to 1.8V using an external resistor divider. The Soft-Start reduces inrush current of the load capacitors and minimizes stress on the input power source during start-up. The TJ2132 delivers high current and ultra-low-dropout output voltage as low as 0.6V for applications where V_{OUT} is very close to V_{IN}. The TJ2132 is developed on a CMOS technology which allows low quiescent current operation independent of output current. This technology also allows the TJ2132 to operate under extremely low dropout conditions.

OPERATING RATINGS

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Recommend Operating Input Voltage	V_{IN}	1.1	3.6	V
Recommend Operating Bias Voltage	V_{BIAS}	V_{OUT}+2.1	5.5	V
Recommend Enable Input Voltage	V_{EN}	0	5.5	V
Recommend Output Voltage Range	V_{OUT}	0.6	1.8	V
Operating Junction Temperature Range	T_{JOPR}	-40	125	℃
Package Thermal Resistance*	$\theta_{JA\text{-}SOP8\text{-}PP}$	68		℃/W

* Calculated from package in sill air, mounted to 2.6mm X 3.5mm(minimum foot print) 2 layer PCB without thermal vias per JESD51 standards.

Please contact us for more information about this product.

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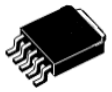
2A Ultra Low Dropout Linear Regulator TJ4320

FEATURES

- Ultra Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 2A
- Available in SOP-8, SOP-8PP, TO-252-5L Packages
- Fixed Output: 1.0V, 1.2V, 1.5V, 1.8V, 2.5V, and 3.3V
- VOUT Power OK Signal
- Programmable Soft-Start Function
- Output Auto Discharge Function
- Over-Temperature/Over-Current Protection

SOP-8 / SOP-8PP

TO-252-5L



APPLICATION

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

DESCRIPTION

The TJ4320 series of high performance ultra-low dropout linear regulators operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TJ4320 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TJ4320 to operate under extremely low dropout conditions.

ORDERING INFORMATION

Device	Package
TJ4320GD-ADJ	SOP-8
TJ4320GD-X.X	
TJ4320GDP-ADJ	SOP-8PP
TJ4320GDP-X.X	
TJ4320GRS-ADJ	TO-252-5L

X.X = Output Voltage = 1.0, 1.2, 1.5, 1.8, 2.5, and 3.3

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage (Survival)	V_{IN}	-	6.5	V
Maximum Output Current	I_{MAX}	-	2	A
Lead Temperature (Soldering, 5 sec)	T_{SOL}		260	ºC
Storage Temperature Range	T_{STG}	-65	150	ºC
Operating Junction Temperature Range	T_{JOPR}	-40	125	ºC
Package Thermal Resistance *	$\Theta_{JA\text{-}SOP\text{-}8PP}$	68		ºC/W

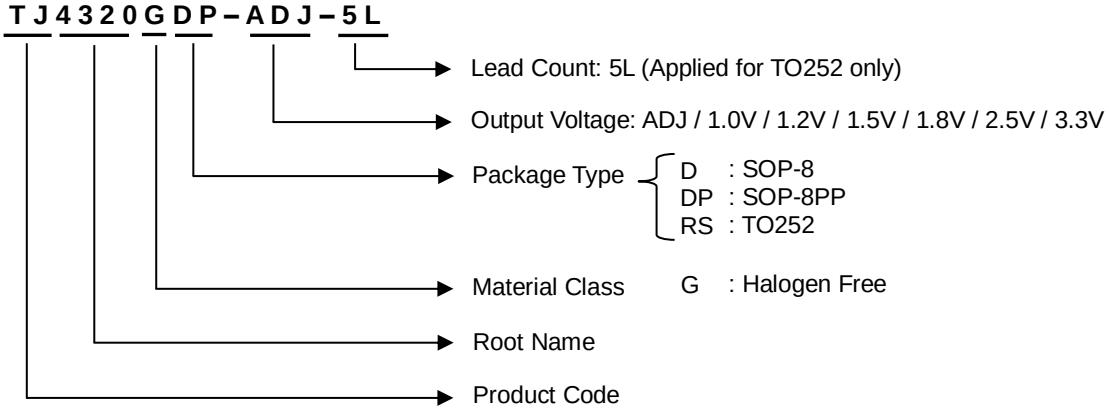
* Calculated from package in still air, mounted to 2.6mm X 3.5mm(minimum foot print) 2 layer PCB without thermal vias per JESD51 standards

OPERATING RATINGS (Note 2)

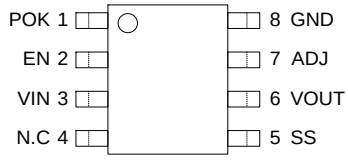
CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Recommend Operating Input Voltage	V_{IN}	2.5	5.5	V

ORDERING INFORMATION

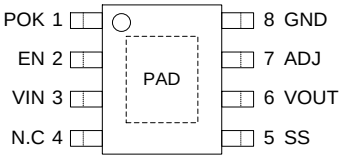
V_{OUT}	Package	Order No.	Description	Package Marking	Status
ADJ	SOP-8	TJ4320GD-ADJ	2A, Adjustable, Enable, Soft Start, Power Good	TJ4320G	Contact Us
	SOP-8PP	TJ4320GDP-ADJ	2A, Adjustable, Enable, Soft Start, Power Good	TJ4320G	Active
	TO-252-5L	TJ4320GRS-ADJ-5L	2A, Adjustable, Enable	TJ4320G	Active
1.0V	SOP-8	TJ4320GD-1.0	2A, Enable, Soft Start, Power Good	TJ4320G 1.0	Contact Us
	SOP-8PP	TJ4320GDP-1.0	2A, Enable, Soft Start, Power Good	TJ4320G 1.0	Contact Us
1.2V	SOP-8	TJ4320GD-1.2	2A, Enable, Soft Start, Power Good	TJ4320G 1.2	Contact Us
	SOP-8PP	TJ4320GDP-1.2	2A, Enable, Soft Start, Power Good	TJ4320G 1.2	Contact Us
1.5V	SOP-8	TJ4320GD-1.5	2A, Enable, Soft Start, Power Good	TJ4320G 1.5	Contact Us
	SOP-8PP	TJ4320GDP-1.5	2A, Enable, Soft Start, Power Good	TJ4320G 1.5	Contact Us
1.8V	SOP-8	TJ4320GD-1.8	2A, Enable, Soft Start, Power Good	TJ4320G 1.8	Contact Us
	SOP-8PP	TJ4320GDP-1.8	2A, Enable, Soft Start, Power Good	TJ4320G 1.8	Contact Us
2.5V	SOP-8	TJ4320GD-2.5	2A, Enable, Soft Start, Power Good	TJ4320G 2.5	Contact Us
	SOP-8PP	TJ4320GDP-2.5	2A, Enable, Soft Start, Power Good	TJ4320G 2.5	Contact Us
3.3V	SOP-8	TJ4320GD-3.3	2A, Enable, Soft Start, Power Good	TJ4320G 3.3	Contact Us
	SOP-8PP	TJ4320GDP-3.3	2A, Enable, Soft Start, Power Good	TJ4320G 3.3	Contact Us



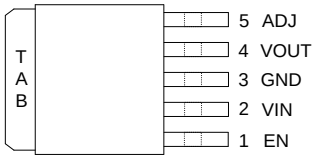
PIN CONFIGURATION



SOP-8



SOP-8PP

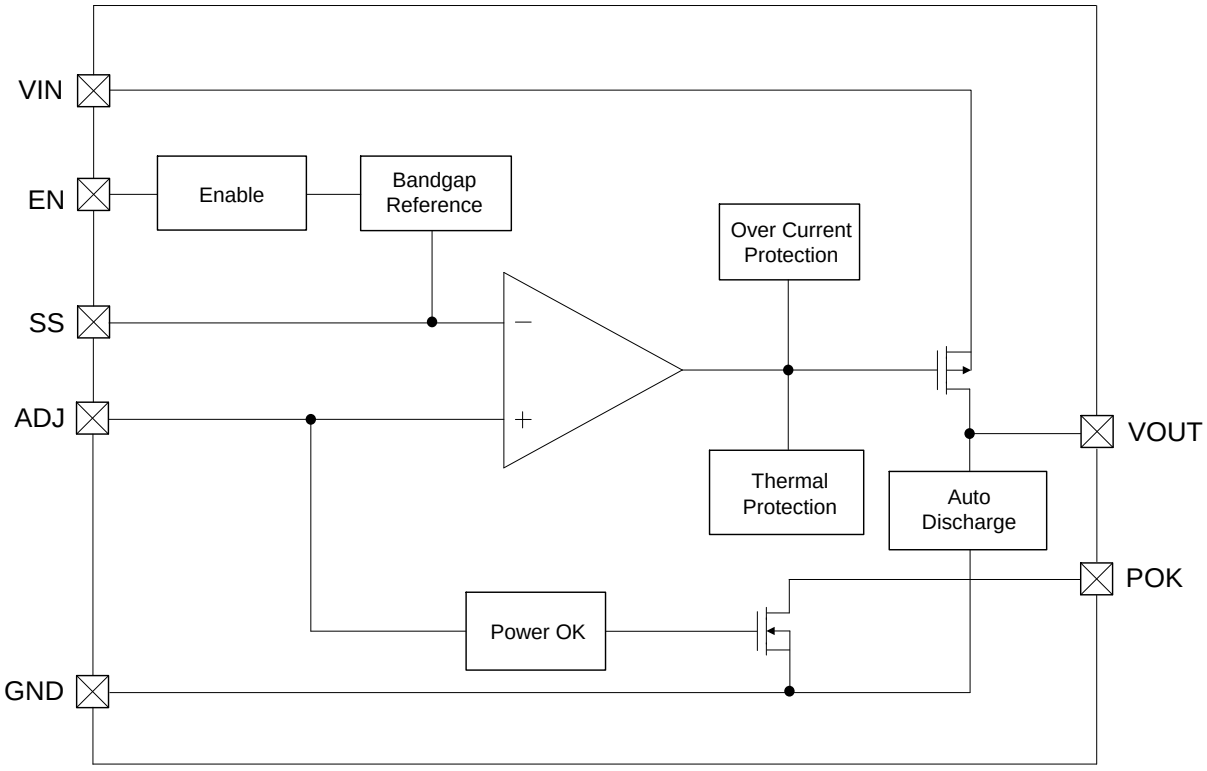


TO-252-5L

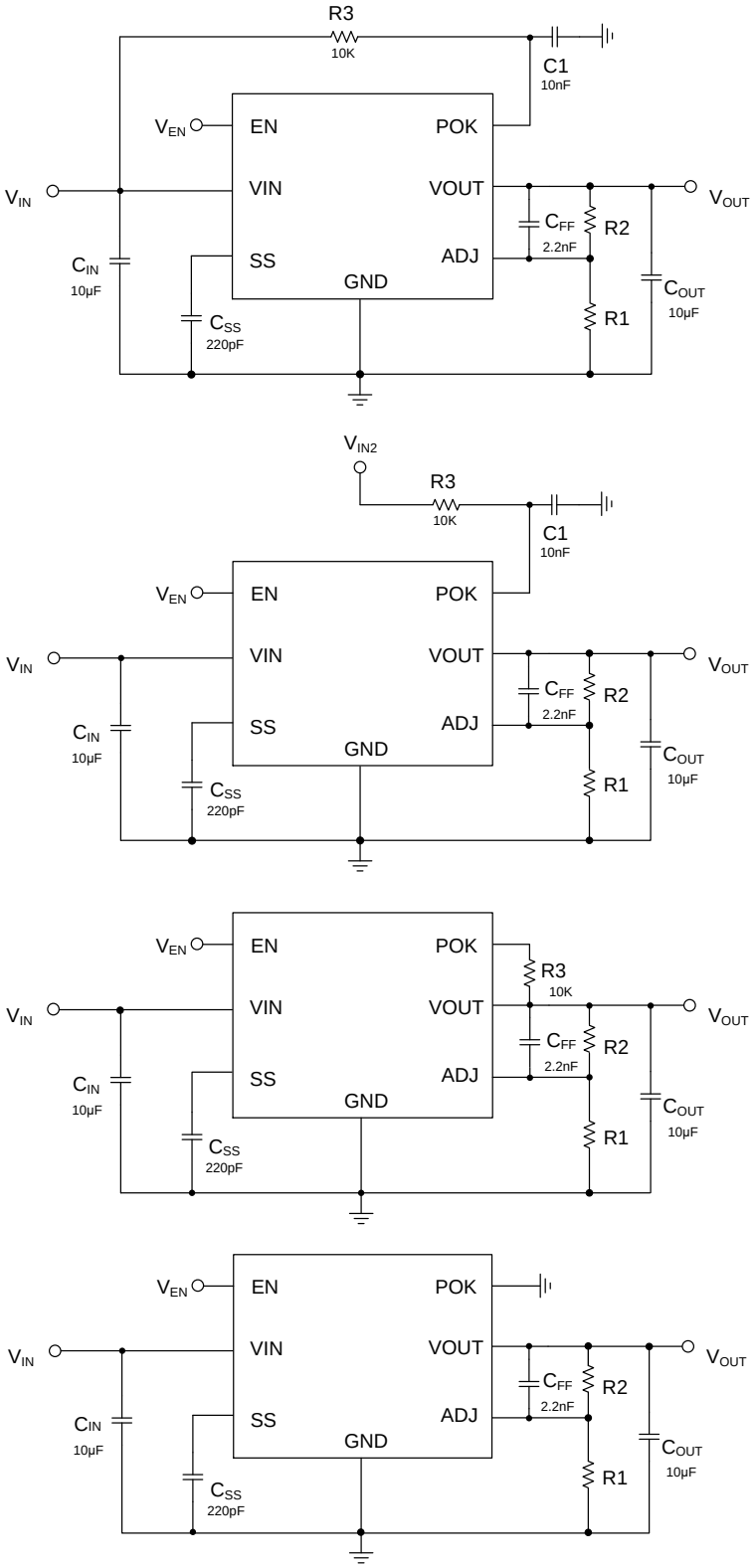
PIN DESCRIPTION

Pin No.			Pin Name	Pin Function
SOP-8	SOP-8PP	TO-252-5L		
1	1	-	POK	Power OK Indication. This pin is an open-drain output and is set high impedance once V_{OUT} reaches 92% of its rating voltage.
2	2	1	EN	Chip Enable. Pulling this pin below 0.4V turns the regulator off. Do not float.
3	3	2	VIN	Input Supply.
4	4	-	N.C	No connection.
5	5	-	SS	Soft-Start. Connect a capacitor between this pin and the ground. Do not connect to ground.
6	6	4	VOUT	Output Voltage.
7	7	5	ADJ	Output Adjust.
8	8	3	GND	Ground.
-	PAD	TAB	Thermal Exposed PAD / TAB	Connect to ground.

BLOCK DIAGRAM



TYPICAL APPLICATION



ELECTRICAL CHARACTERISTICS (Note 3)

Limits in standard typeface are for T_J=25ºC, and limits in **boldface type** apply over the **full operating temperature range**.
Unless otherwise specified: V_{IN}(Note 4) = $V_{O(NOM)}$ + 1 V, I_L = 10 mA, C_{IN} = 10 µF, C_{OUT} = 10 µF, V_{EN} = V_{IN} - 0.3 V

PARAMETER		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage Tolerance		V_O	V_{OUT}+1 V < V_{IN} < 5.5 V	-2 **-3**	0	2 **3**	%
Adjustable Pin Voltage (ADJ version)		V_{ADJ}	2.5 V < V_{IN} < 5.5 V	0.588 **0.582**	0.6	0.612 **0.618**	V
Line Regulation(Note 5)		ΔV_{LINE}	V_{OUT}+1 V < V_{IN} < 5.5 V	-	0.25	-	%/V
Load Regulation(Note 5, 6)		ΔV_{LOAD}	10 mA < I_L < 2 A	-	0.20	-	%
Dropout Voltage(Note 7)		V_{DROP}	I_L = 200 mA	-	45	55 **65**	mV
			I_L = 2 A	-	400	500 **600**	
Ground Pin Current(Note 8)		I_{GND}	I_L = 200 mA	-	0.20	0.30 **0.40**	mA
			I_L = 2 A	-	0.30	0.40 **0.60**	
Ground Pin Current(Note 9)		I_{GND_OFF}	V_{EN} < 0.2 V, POK=Open	-	0.1	- **1**	µA
Power Supply Rejection Ratio		PSRR	f = 1kHz	-	45	-	dB
			f = 1kHz, C_{FF} = 1µF	-	60	-	
Thermal Shutdown Temperature		T_{SD}	-	-	165	-	ºC
Thermal Shutdown Hysteresis		ΔT_{SD}	-	-	20	-	ºC
OCP Threshold Level		I_{OCP}	-	-	3.6	-	A
Power OK Threshold		V_{POKTH}	-	-	92	-	%
Power OK Hysteresis		V_{POKHYS}	-	-	7	-	%
Auto Discharge Resistance		R_{DS}	V_{IN} = 5V, V_{EN} = 0V	-	330	-	Ω
Enable threshold	Logic Low	V_{IL}	Output = Low	-	-	0.4	V
	Logic High	V_{IH}	Output = High	2.0	-	-	V
Enable Input Current		I_{EN}	V_{EN} = V_{IN}	-	0.1	- **1**	µA

Note 1. Exceeding the absolute maximum ratings may damage the device.

Note 2. The device is not guaranteed to function outside its operating ratings.

Note 3. Stresses listed as the absolute maximum ratings may cause permanent damage to the device. These are for stress ratings. Functional operating of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibly to affect device reliability.

Note 4. The minimum operating value for input voltage is equal to either ($V_{OUT,NOM}$ + V_{DROP}) or 2.5V, whichever is greater.

Note 5. Output voltage line regulation is defined as the change in output voltage from the nominal value due to change in the input line voltage. Output voltage load regulation is defined as the change in output voltage from the nominal value due to change in load current.

Note 6. Regulation is measured at constant junction temperature by using a 10ms current pulse. Devices are tested for load regulation in the load range from 10mA to 2A.

Note 7. Dropout voltage is defined as the minimum input to output differential voltage at which the output drops 2% below the nominal value. Dropout voltage specification applies only to output voltages of 2.5V and above. For output voltages below 2.5V, the dropout voltage is nothing but the input to output differential, since the minimum input voltage is 2.5V

Note 8. Ground current, or quiescent current, is the difference between input and output currents. It's defined by $I_{GND1} = I_{IN} - I_{OUT}$ under the given loading condition. The total current drawn from the supply is the sum of the load current plus the ground pin current.

Note 9. Ground current, or standby current, is the input current drawn by a regulator when the output voltage is disabled by an enable signal.

APPLICATION INFORMATION

Introduction

TJ4320 is intended for applications where high current capability and very low dropout voltage are required. It provides a simple, low cost solution that occupies very little PCB estate. Additional features include an enable pin to allow for a very low power consumption standby mode, an adjustable pin to provide a fully adjustable output voltage.

Component Selection

Input Capacitor

A large bulk capacitance over than 10μF should be closely placed to the input supply pin of the TJ4320 to ensure that the input supply voltage does not sag. Also a minimum of 10μF ceramic capacitor is recommended to be placed directly next to the VIN Pin. It allows for the device being some distance from any bulk capacitor on the rail. Additionally, input droop due to load transients is reduced, improving load transient response. Additional capacitance may be added if required by the application.(See Fig.1)

Output Capacitor

A minimum ceramic capacitor over than 10μF should be very closely placed to the output voltage pin of the TJ4320. Increasing capacitance will improve the overall transient response and stability. When applying an output capacitor that has big capacitance, the soft start time using soft start capacitor at SS pin should be carefully adjusted to avoid any in-rush current problem.

Decoupling (Bypass) Capacitor

In very electrically noisy environments, it is recommended that additional ceramic capacitors be placed from VIN to GND. The use of multiple lower value ceramic capacitors in parallel with output capacitor also allows to achieve better transient performance and stability if required by the application.(See Fig.1)

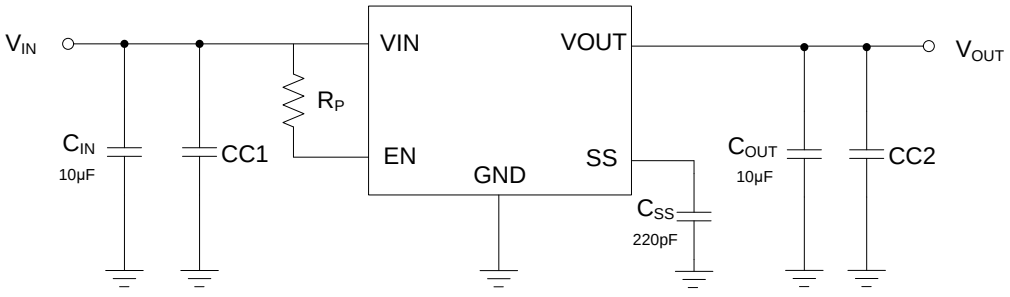


Fig. 1. Application with Decoupling Capacitor, CC1 & CC2

Feed-Forward Capacitor

To get the higher PSRR than the inherent performance of TJ4320, it is recommended that additional ceramic feed-forward capacitor be placed from VOUT pin to ADJ pin. The capacitance of feed-forward capacitor with

range of 2.2nF to 1μF allows to achieve better PSRR performance when required by the application.(See Fig.2)

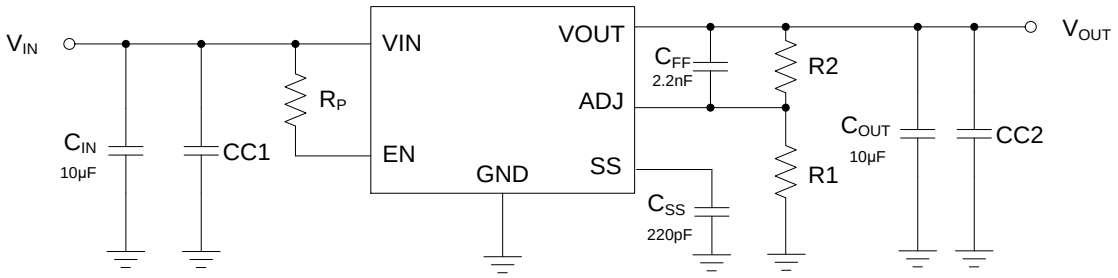


Fig. 2. Application with Feed-Forward Capacitor, CFF

Delayed Start-Up

When power sequence control is required or rising time of input supply voltage is over than 100μsec, it is recommended to apply delayed start-up by using Cdelay as shown in Fig. 3. It can adjust proper delay by Rp-Cdelay time constant. And also it can prevent any unexpected transient characteristics at output voltage when the rising time of input supply voltage is as long as 100μsec or longer.

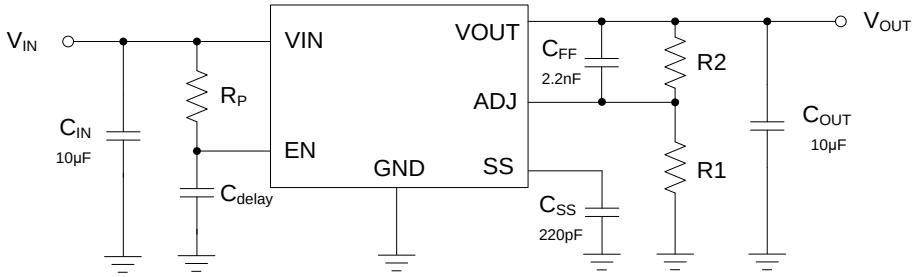
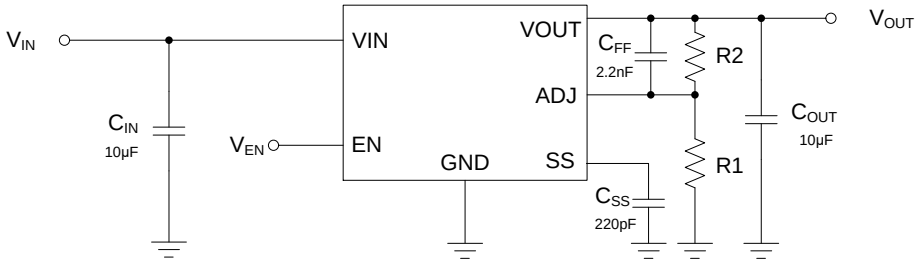


Fig. 3. Application with Delayed Start-Up

Output Adjustment (Adjustable Version)

An adjustable output device has output voltage range of 1.0V to 5.0V. The operating condition of V_{IN} and the operating characteristics of V_{OUT} depend on the dropout voltage performance in accordance with output load current. To obtain a desired output voltage, the following equation can be used with R1 resistor range of 1kΩ to 100kΩ.



$$R_2 = R_1\left(\frac{V_{OUT}}{0.6}-1\right)$$

Fig. 4. Application for Adjustable Output Voltage

To enhance output stability, a feed-forward capacitor of 2.2nF to 1μF can be placed in series with V_{OUT} and

ADJ.(Refer to "Component Selection" Section)

Soft Start Time

The TJ4320 has an internal current source that charges an external slow start capacitor to implement a slow start time. Equation and Table 1 shows how to select a slow start capacitor based on an expected slow start time. The R is 450kΩ, V_O is 0.6V and i(t) is 130nA. Adjustment of soft start time using SS pin capacitor is help to suppress unexpected abnormal in-rush current that can cause device failure.

$$T_{SS}(s) = -RC_{SS} \times \ln \frac{i(t)R}{V_o}$$

C_{SS}	Calculated Soft-Start Time
220pF	0.23ms
470pF	0.49ms
1nF	1.04ms
2.7nF	2.82ms
5.6nF	5.86ms
10nF	10.4ms

Table 1. Capacitor Values for the soft-start time

Auto Discharge Function

The TJ4320 provides an auto discharge function that is used for faster discharging of the output capacitor. This function is automatically activated when the EN input goes into an active low state.

Maximum Output Current Capability

The TJ4320 can deliver a continuous current of 2A over the full operating junction temperature range. However, the output current is limited by the restriction of power dissipation which differs from packages. A heat sink may be required depending on the maximum power dissipation and maximum ambient temperature of application. With respect to the applied package, the maximum output current of 2A may be still undeliverable due to the restriction of the power dissipation of TJ4320. Under all possible conditions, the junction temperature must be within the range specified under operating conditions.
The temperatures over the device are given by:

$$T_C = T_A + P_D \text{ X } \theta_{CA}$$
$$T_J = T_C + P_D \text{ X } \theta_{JC}$$
$$T_J = T_A + P_D \text{ X } \theta_{JA}$$

where T_J is the junction temperature, T_C is the case temperature, T_A is the ambient temperature, P_D is the total power dissipation of the device, θ_{CA} is the thermal resistance of case-to-ambient, θ_{JC} is the thermal resistance of junction-to-case, and θ_{JA} is the thermal resistance of junction to ambient.
The total power dissipation of the device is given by:

$$P_D = P_{IN} - P_{OUT} = (V_{IN} \text{ X } I_{IN}) - (V_{OUT} \text{ X } I_{OUT})$$
$$= (V_{IN} \text{ X } (I_{OUT}+I_{GND})) - (V_{OUT} \text{ X } I_{OUT}) = (V_{IN} - V_{OUT}) \text{ X } I_{OUT} + V_{IN} \text{ X } I_{GND}$$

where I_{GND} is the operating ground current of the device which is specified at the Electrical Characteristics. The maximum allowable temperature rise (T_{Rmax}) depends on the maximum ambient temperature (T_{Amax}) of the

application, and the maximum allowable junction temperature (T_{Jmax}):

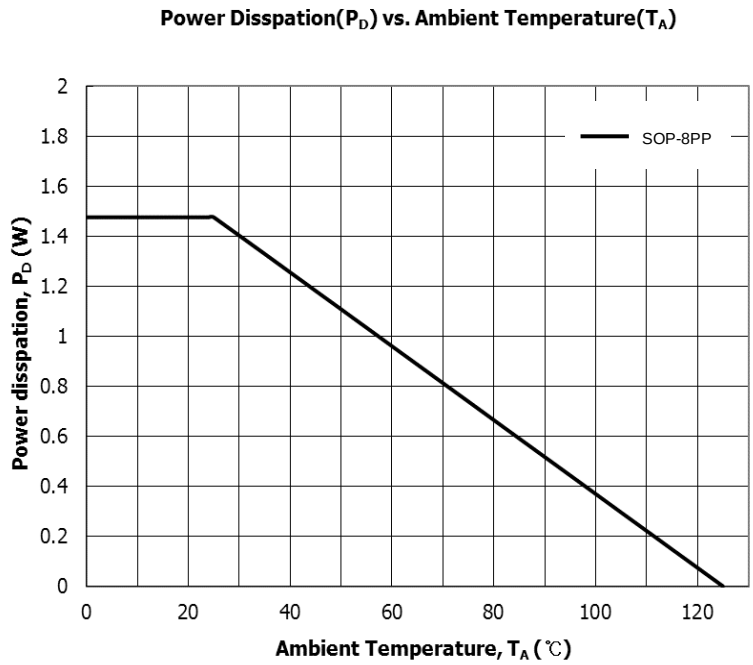
$$T_{Rmax} = T_{Jmax} - T_{Amax}$$

The maximum allowable value for junction-to-ambient thermal resistance, θ_{JA}, can be calculated using the formula:

$$\theta_{JA} = T_{Rmax} / P_D$$

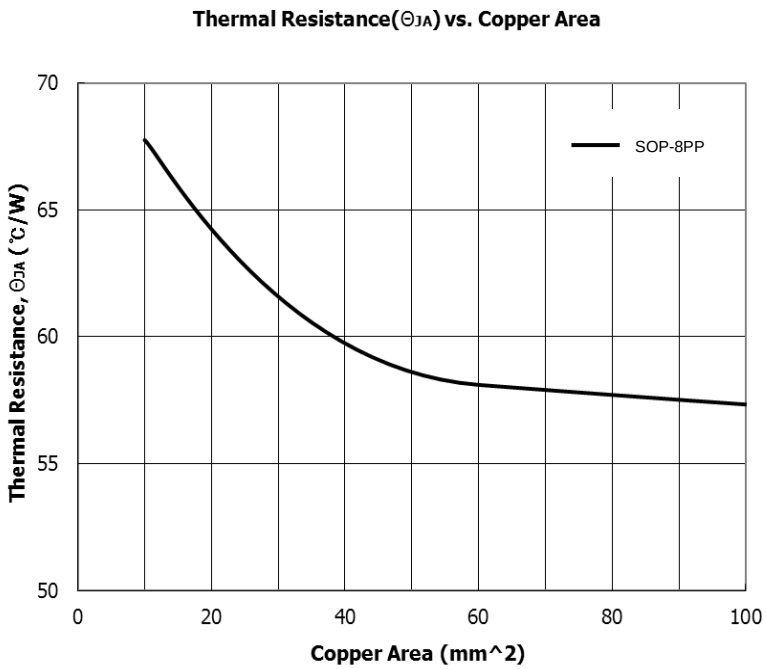
TJ4320 is available in SOP-8, SOP-8PP, TO-252-5L packages. The thermal resistance depends on amount of copper area or heat sink, and on air flow.

If proper cooling solution such as heat sink, copper plane area, or air flow is applied, the maximum allowable power dissipation could be increased. However, if the ambient temperature is increased, the allowable power dissipation would be decreased.



The graph above is valid for the thermal impedance specified in the Absolute Maximum Ratings section on page 1.

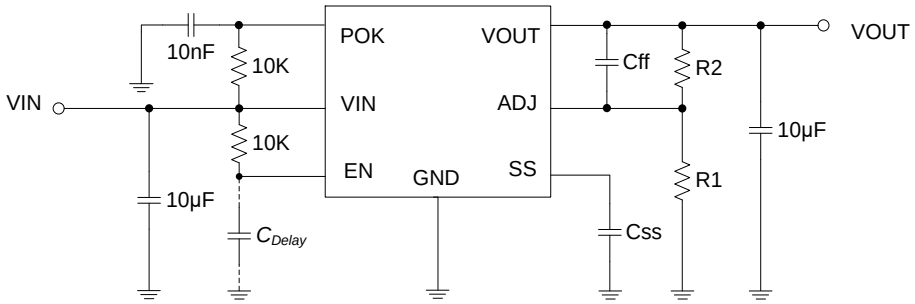
The θ_{JA} could be decreased with respect to the copper plane area. So, the specification of maximum power dissipation for an application is fixed, the proper plane area could be estimated by following graphs. Wider copper plane area leads lower θ_{JA}.



The maximum allowable power dissipation is also influenced by the ambient temperature. With the θ_{JA}-Copper plane area relationship, the maximum allowable power dissipation could be evaluated with respect to the ambient temperature. As shown in graph, the higher copper plane area leads θ_{JA}. And the higher ambient temperature leads lower maximum allowable power dissipation.

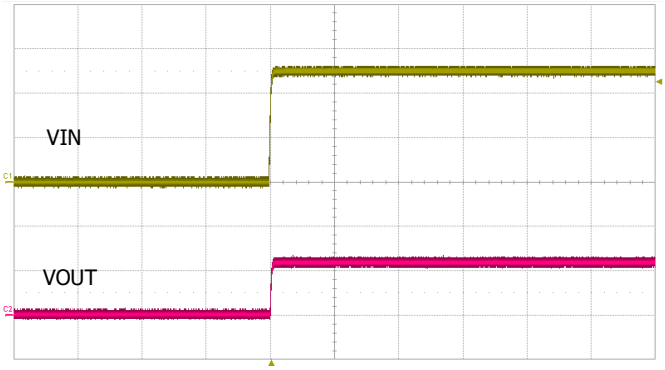
TYPICAL OPERATING CHARACTERISTICS

Test Circuit



VOUT = 1.2V (VIN = 2.5V, R1 = 10KΩ, R2 = 10KΩ)

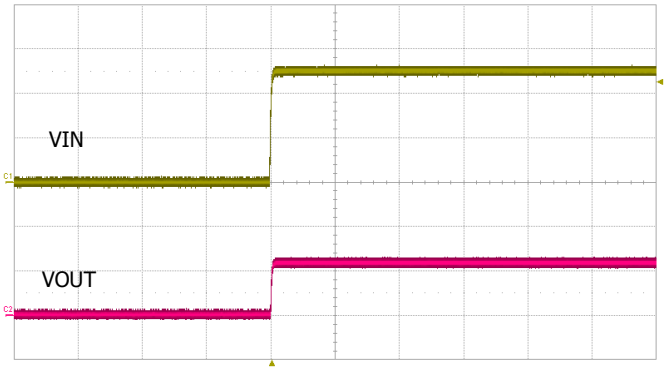
VOUT = 1.2V (Css = 220pF, Cff = 2.2nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0A

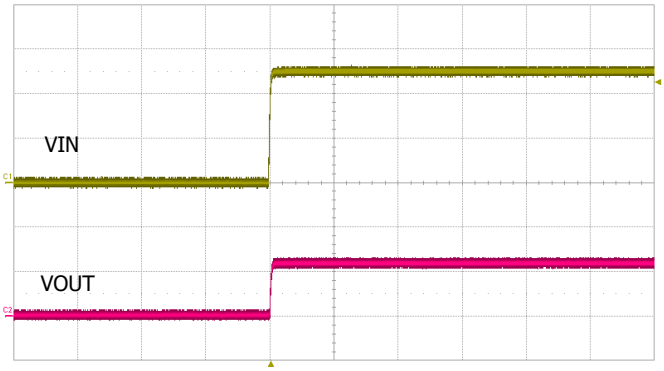
VOUT = 1.2V (Css = 220pF, Cff = 2.2nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=2A

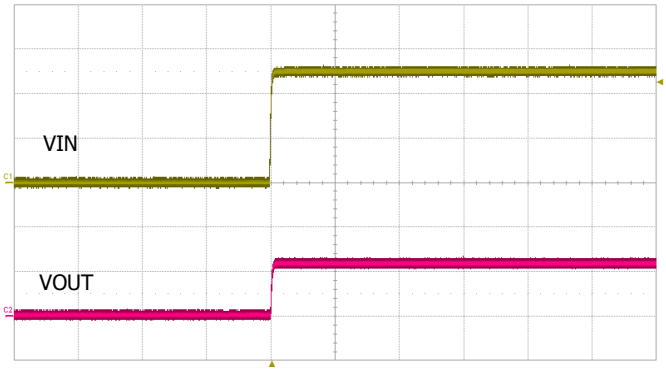
VOUT = 1.2V (Css = 220pF, Cff = 10nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0A

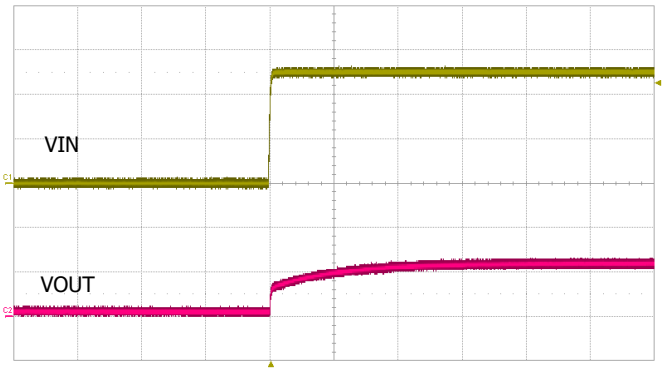
VOUT = 1.2V (Css = 220pF, Cff = 10nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=2A

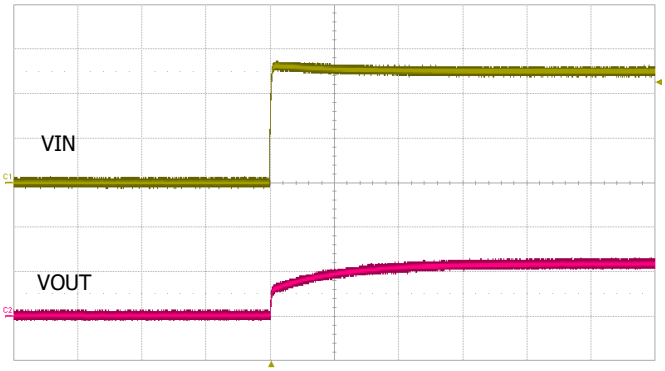
VOUT = 1.2V (Css = 220pF, Cff = 1µF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0A

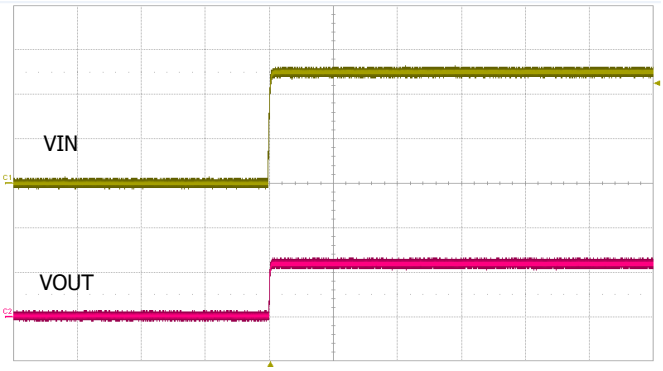
VOUT = 1.2V (Css = 220pF, Cff = 1µF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=2A

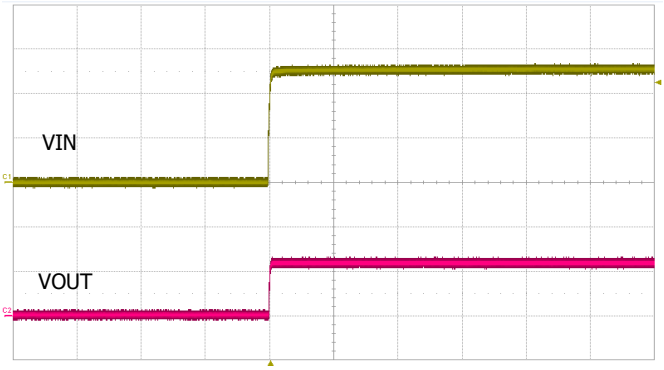
VOUT = 1.2V (Cff = 10nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0A

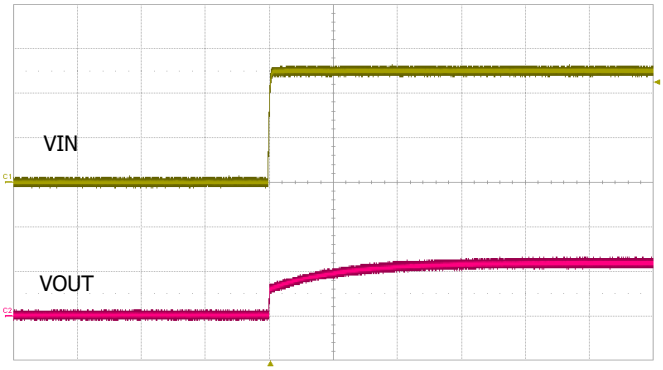
VOUT = 1.2V (Cff = 10nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=2A

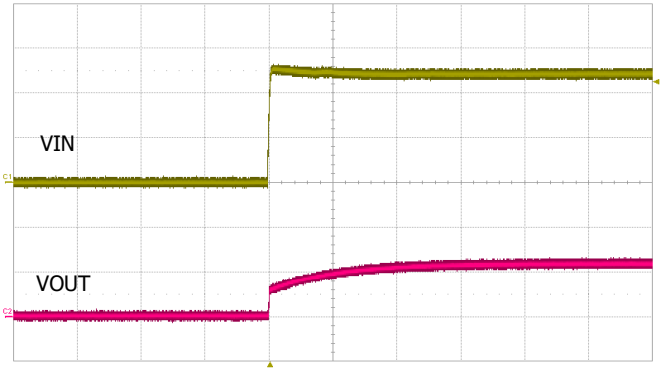
VOUT = 1.2V (Cff = 1µF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=0A

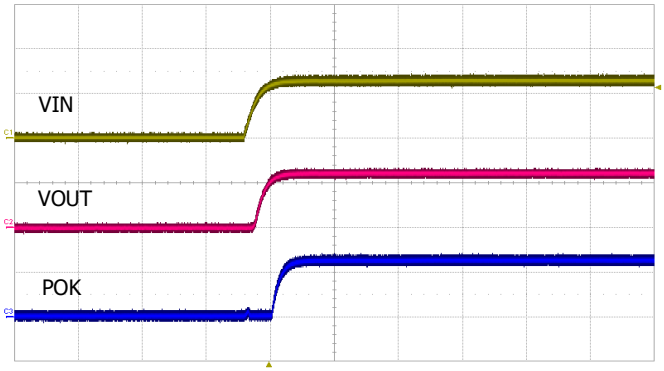
VOUT = 1.2V (Cff = 1µF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=2A

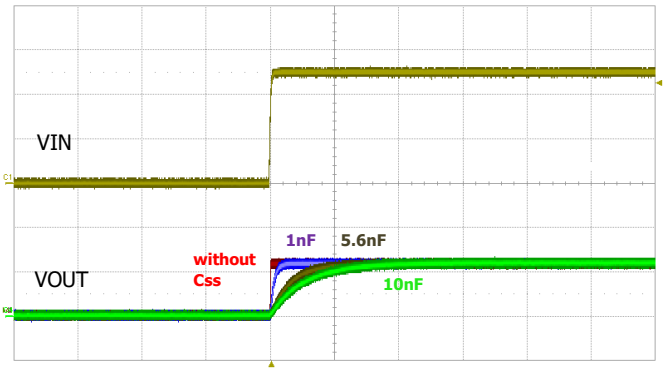
VOUT = 1.2V (Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VOUT : 1.0V/div, POK : 2.0V/div, Time : 1ms/div

Start Up @ Iout=2A

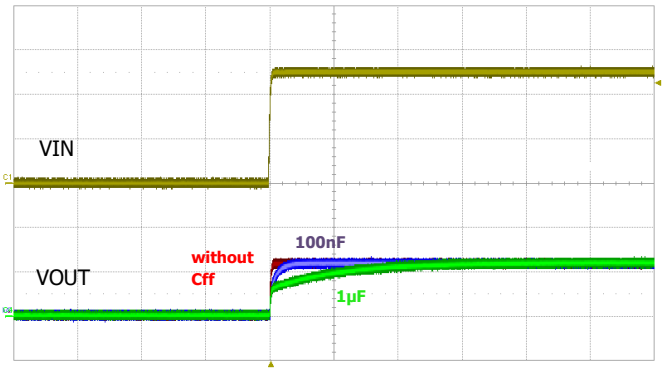
VOUT = 1.2V (Css : varied, Cff = 2.2nF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=10mA

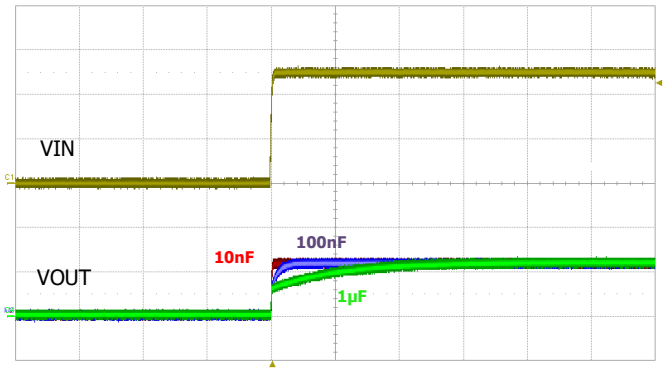
VOUT = 1.2V (Cff : varied, Css = 220pF)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=10mA

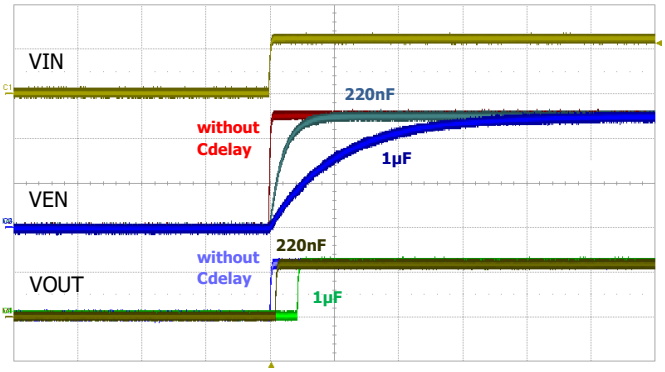
VOUT = 1.2V (Cff : varied)



VIN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up @ Iout=10mA

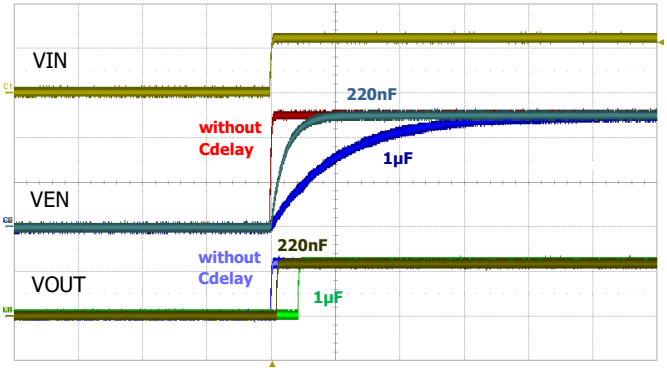
VOUT = 1.2V (Cdelay : varied, Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VEN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up with Cdelay @ Iout=10mA

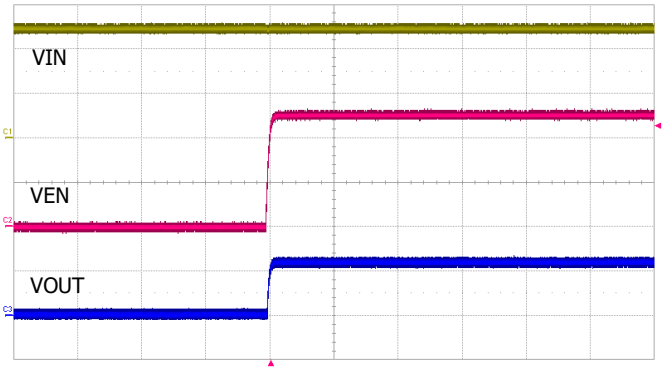
VOUT = 1.2V (Cdelay : varied, Cff = 10nF)



VIN : 2.0V/div, VEN : 1.0V/div, VOUT : 1.0V/div, Time : 10ms/div

Start Up with Cdelay @ Iout=10mA

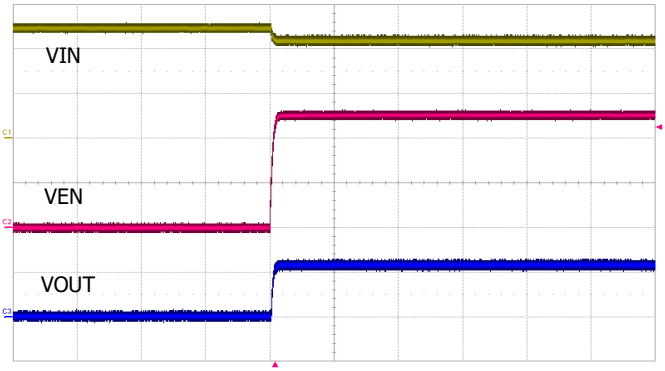
VOUT = 1.2V (Css = 220pF, Cff = 2.2nF)



VIN : 1.0V/div, VEN : 1.0V/div, VOUT : 1.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=0A

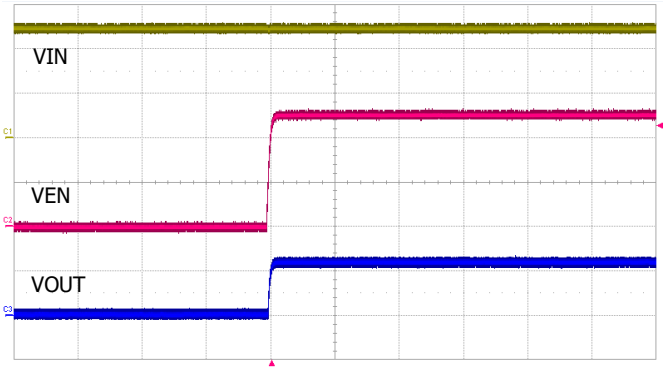
VOUT = 1.2V (Css = 220pF, Cff = 2.2nF)



VIN : 1.0V/div, VEN : 1.0V/div, VOUT : 1.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=2A

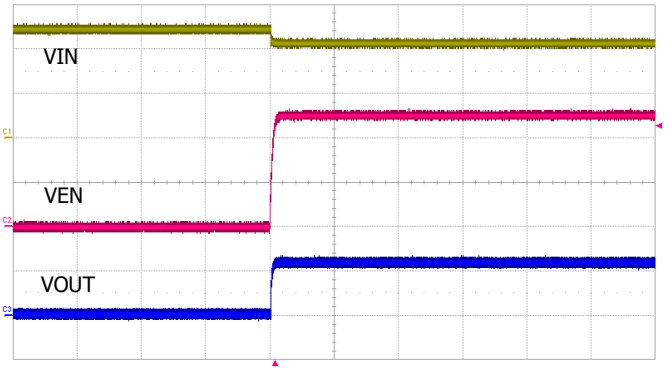
VOUT = 1.2V (Cff = 10nF)



VIN : 1.0V/div, VEN : 1.0V/div, VOUT : 1.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=0A

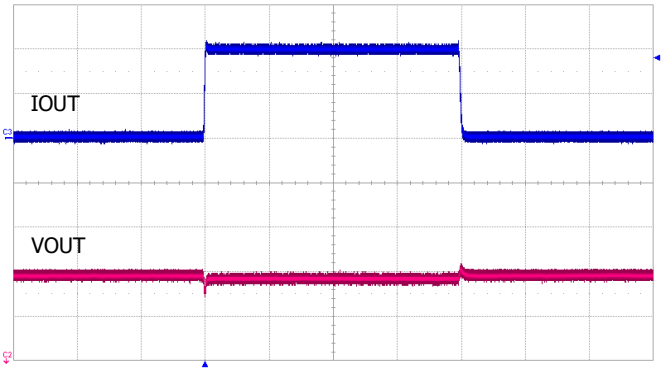
VOUT = 1.2V (Cff = 10nF)



VIN : 1.0V/div, VEN : 1.0V/div, VOUT : 1.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=2A

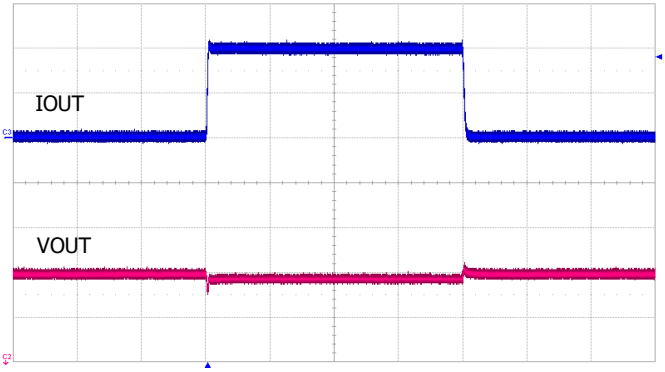
VOUT = 1.2V (Css = 220pF, Cff = 2.2nF)



IOUT : 1.0A/div, VOUT : 100mV/div, Time : 500µs/div

Load Transient Response

VOUT = 1.2V (Cff = 10nF)

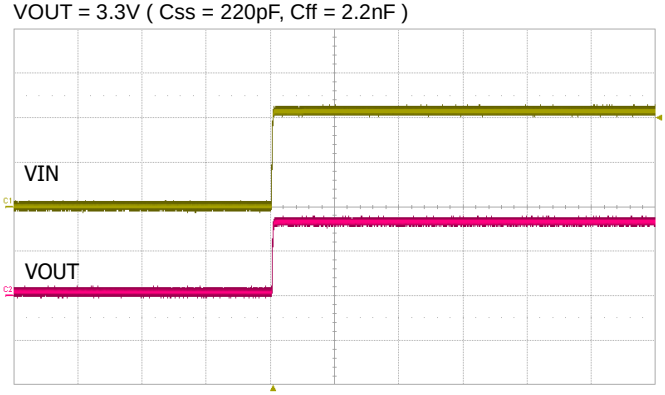


IOUT : 1.0A/div, VOUT : 100mV/div, Time : 500µs/div

Load Transient Response

VOUT = 3.3V (VIN = 4.3V, R1 = 10KΩ, R2 = 45KΩ)

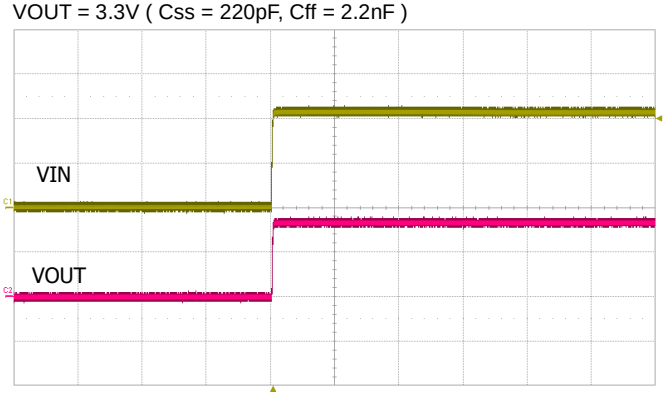
VOUT = 3.3V (Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=0A

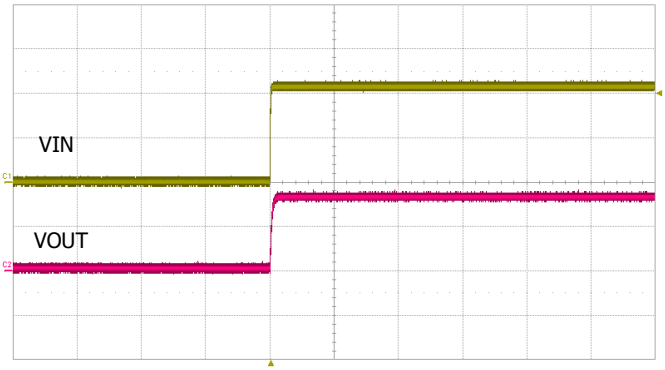
VOUT = 3.3V (Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=2A

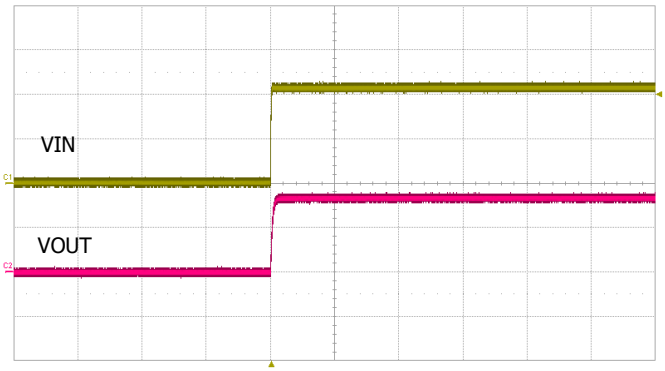
VOUT = 3.3V (Css = 220pF, Cff = 10nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=0A

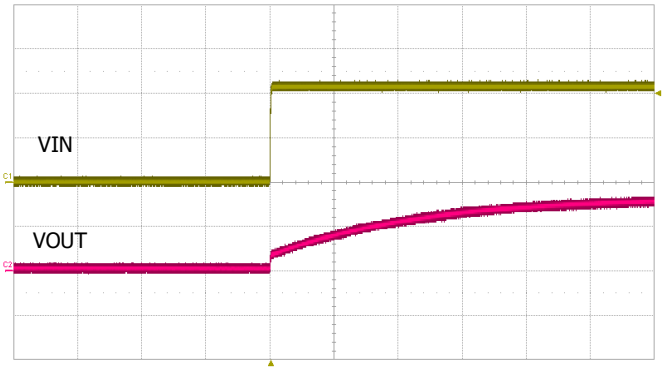
VOUT = 3.3V (Css = 220pF, Cff = 10nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=2A

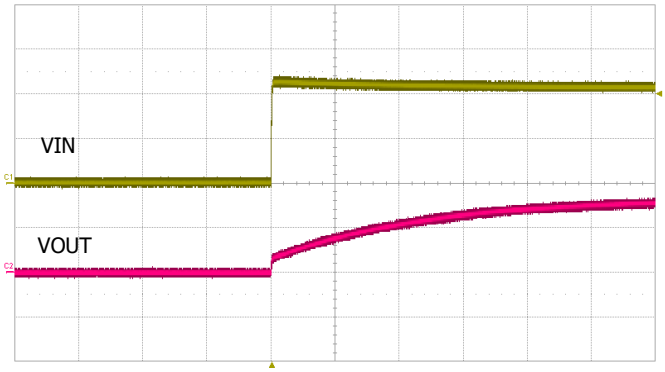
VOUT = 3.3V (Css = 220pF, Cff = 1μF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=0A

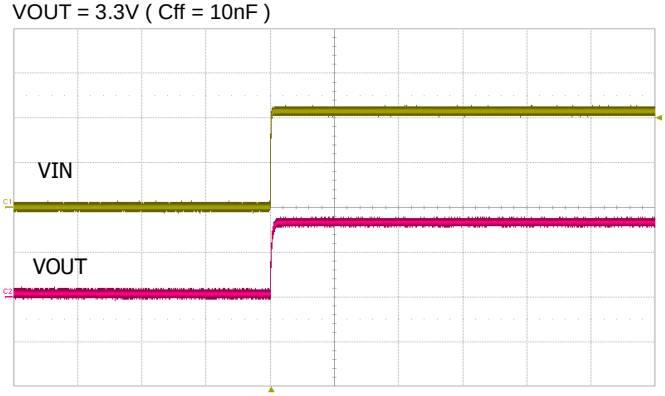
VOUT = 3.3V (Css = 220pF, Cff = 1μF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=2A

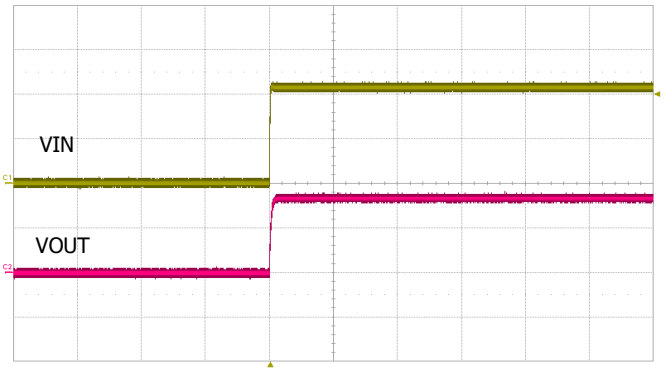
VOUT = 3.3V (Cff = 10nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=0A

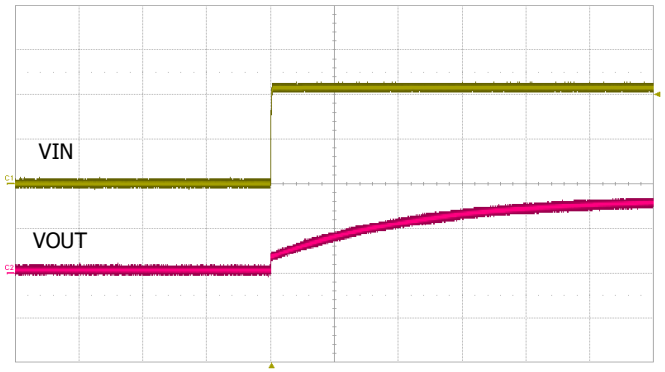
VOUT = 3.3V (Cff = 10nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=2A

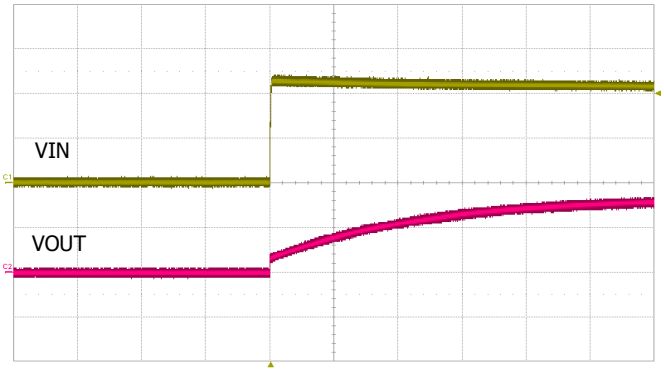
VOUT = 3.3V (Cff = 1µF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=0A

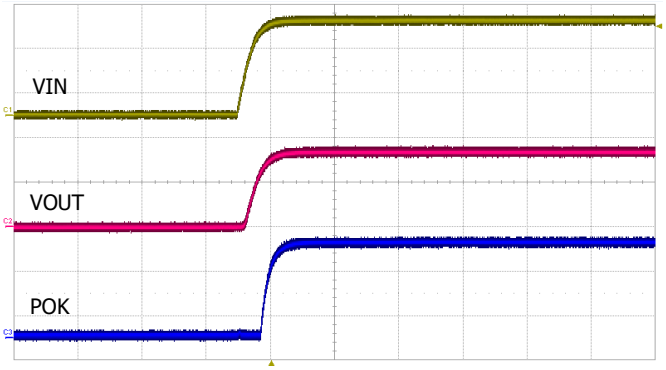
VOUT = 3.3V (Cff = 1µF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 20ms/div

Start Up @ Iout=2A

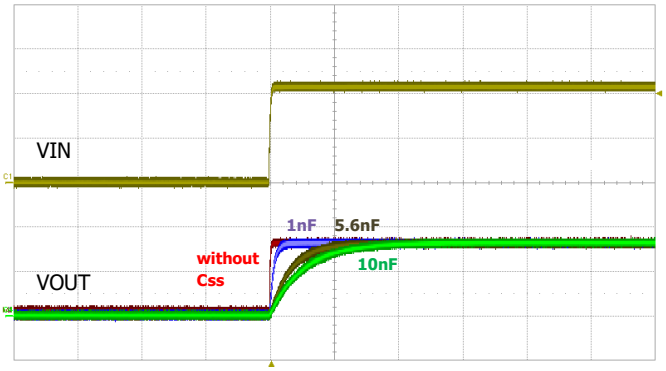
VOUT = 3.3V (Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VOUT : 2.0V/div, POK : 2.0V/div, Time : 1ms/div

Start Up @ Iout=2A

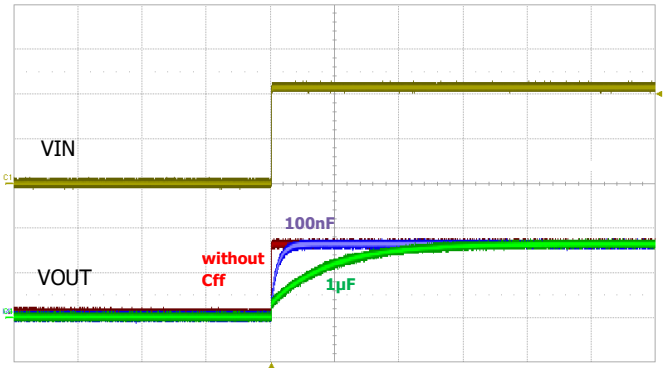
VOUT = 3.3V (Css : varied, Cff = 2.2nF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 10ms/div

Start Up @ Iout=10mA

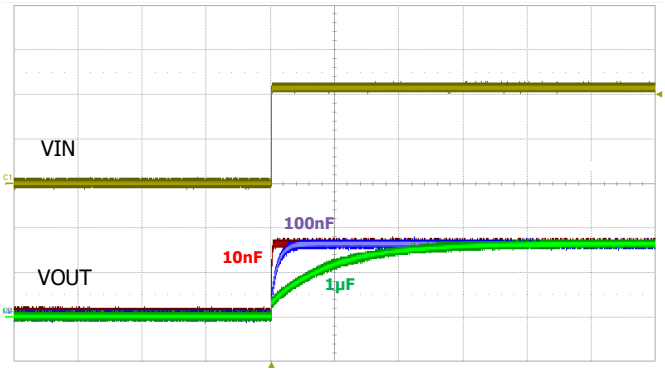
VOUT = 3.3V (Cff : varied, Css = 220pF)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 50ms/div

Start Up @ Iout=10mA

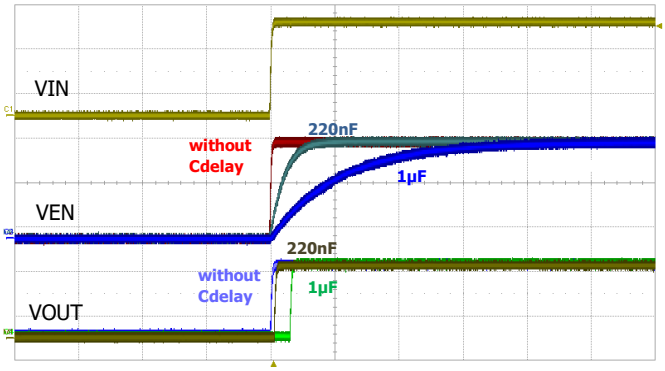
VOUT = 3.3V (Cff : varied)



VIN : 2.0V/div, VOUT : 2.0V/div, Time : 50ms/div

Start Up @ Iout=10mA

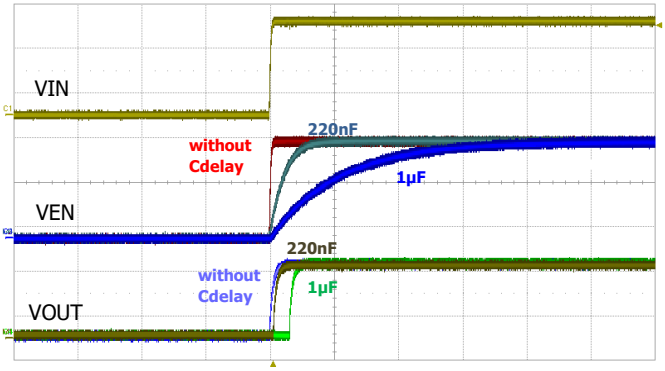
VOUT = 3.3V (Cdelay : varied, Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VEN : 2.0V/div, VOUT : 2.0V/div, Time : 10ms/div

Start Up with Cdelay @ Iout=10mA

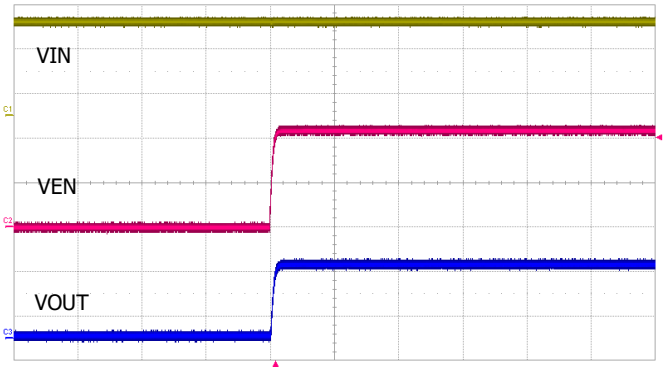
VOUT = 3.3V (Cdelay : varied, Cff = 10nF)



VIN : 2.0V/div, VEN : 2.0V/div, VOUT : 2.0V/div, Time : 10ms/div

Start Up with Cdelay @ Iout=10mA

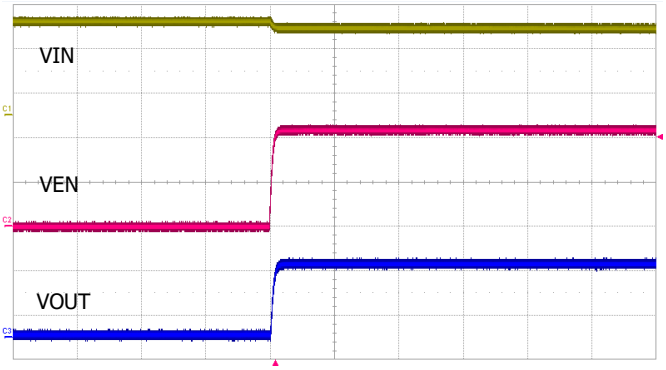
VOUT = 3.3V (Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VEN : 2.0V/div, VOUT : 2.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=0A

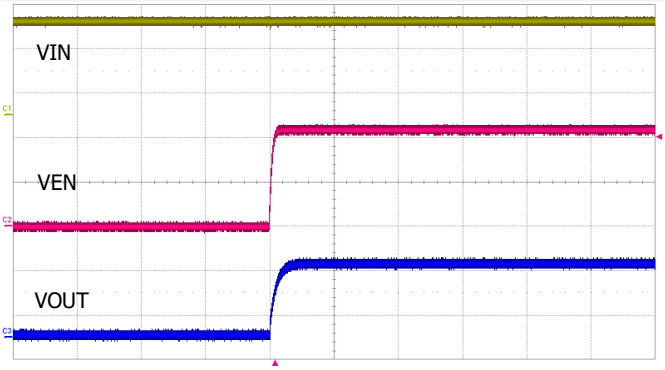
VOUT = 3.3V (Css = 220pF, Cff = 2.2nF)



VIN : 2.0V/div, VEN : 2.0V/div, VOUT : 2.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=2A

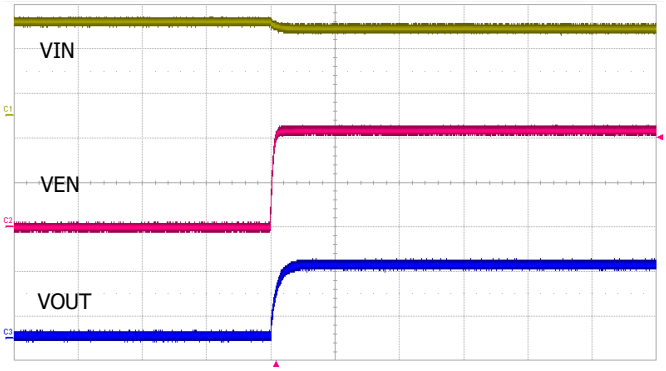
VOUT = 3.3V (Cff = 10nF)



VIN : 2.0V/div, VEN : 2.0V/div, VOUT : 2.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=0A

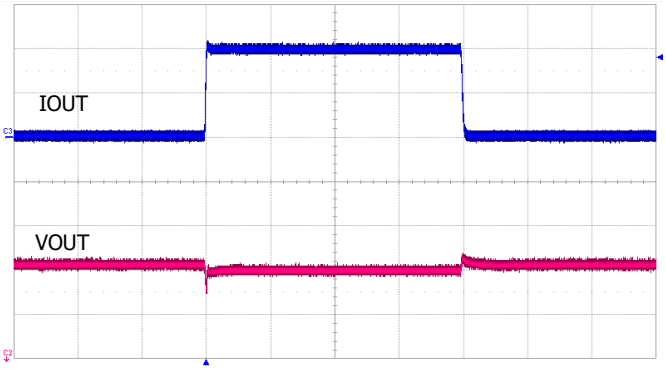
VOUT = 3.3V (Cff = 10nF)



VIN : 2.0V/div, VEN : 2.0V/div, VOUT : 2.0V/div, Time : 5ms/div

Start Up by External VEN @ Iout=2A

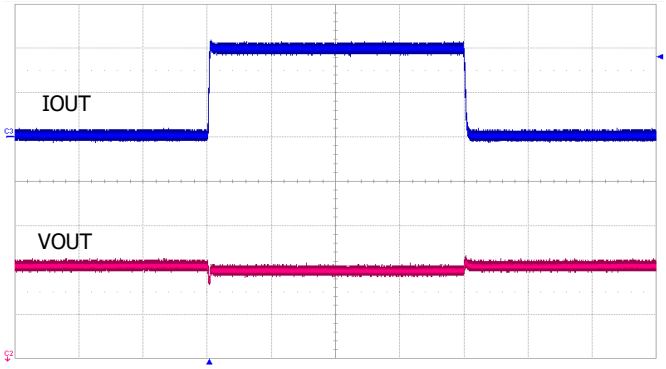
VOUT = 3.3V (Css = 220pF, Cff = 2.2nF)



IOUT : 1.0A/div, VOUT : 100mV/div, Time : 500µs/div

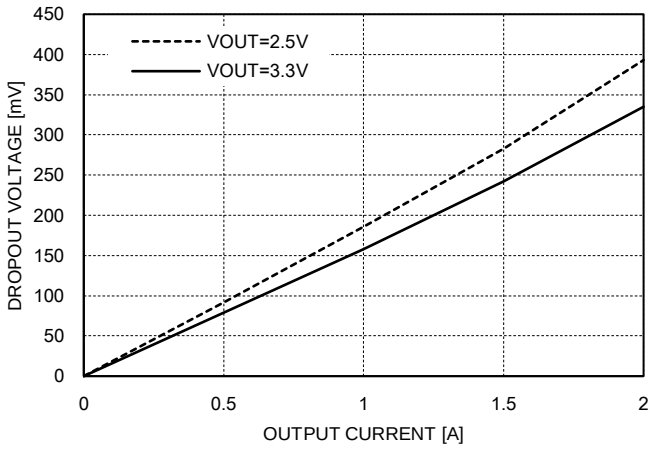
Load Transient Response

VOUT = 3.3V (Cff = 10nF)



IOUT : 1.0A/div, VOUT : 100mV/div, Time : 500µs/div

Load Transient Response



Dropout Voltage

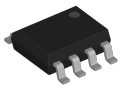
REVISION NOTICE

The description in this datasheet is subject to change without any notice to describe its electrical characteristics properly.

2A Ultra Low Dropout Linear Regulator TPS7A7001

FEATURES

- Ultra-Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 2.0A
- Adjustable Output Voltage up to 4.5V
- Output Auto Discharge Function
- Over-Temperature/ Over-Current Protection
- Available in SOP-8PP Package



SOP-8PP

ORDERING INFORMATION

Device	Package
TPS7A7001DP	SOP-8PP

APPLICATIONS

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

DESCRIPTION

The TPS7A7001 of high performance ultra-low dropout linear regulator operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TPS7A7001 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TPS7A7001 to operate under extremely low dropout conditions.

Please contact us for more information about this product.

ES France - Département Composants & Modules
127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 89
Fax. 01 47 01 16 22
e-mail : comp@es-france.com
Site Web : www.es-france.com

3A Ultra Low Dropout Linear Regulator TJ4330

FEATURES

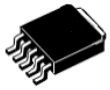
- Ultra Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 3A
- Available in SOP8-PP, TO-252-5L Packages
- Fixed Output: 1.0V, 1.2V, 1.5V, 1.8V, 2.5V, and 3.3V
- VOUT Power OK Signal
- Programmable Soft-Start Function
- Output Auto Discharge Function
- Over-Temperature/Over-Current Protection

APPLICATION

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

SOP8-PP

TO-252-5L



ORDERING INFORMATION

Device	Package
TJ4330GDP-ADJ	SOP8-PP
TJ4330GDP-X.X	
TJ4330GRS-ADJ	TO-252-5L

X.X = Output Voltage = 1.0, 1.2, 1.5, 1.8, 2.5, and 3.3

DESCRIPTION

The TJ4330 series of high performance ultra-low dropout linear regulators operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TJ4330 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TJ4330 to operate under extremely low dropout conditions.

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage (Survival)	V_{IN}	-	6.5	V
Maximum Output Current	I_{MAX}	-	3	A
Lead Temperature (Soldering, 5 sec)	T_{SOL}		260	ºC
Storage Temperature Range	T_{STG}	-65	150	ºC
Operating Junction Temperature Range	T_{JOPR}	-40	125	ºC
Package Thermal Resistance *	$\Theta_{JA\text{-}SOP8\text{-}PP}$	68		ºC/W

* Calculated from package in still air, mounted to 2.6mm X 3.5mm(minimum foot print) 2 layer PCB without thermal vias per JESD51 standards.

Please contact us for more information about this product.

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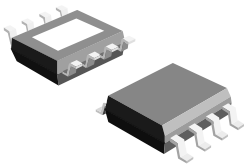
Site Web : www.es-france.com

3A Ultra Low Dropout Linear Regulator TPS7A7002

FEATURES

- Ultra-Low Dropout Voltage
- Compatible with low ESR MLCC as Input / Output Capacitor
- Good Line and Load Regulation
- Guaranteed Output Current of 3A
- Available in SOP8-PP Package
- Output Auto Discharge Function
- Over-Temperature/Over-Current Protection

SOP8-PP



APPLICATION

- LCD TVs and SETTOP Boxes
- Battery Powered Equipment
- Motherboards and Graphic Cards
- Microprocessor Power Supplies
- Peripheral Cards
- High Efficiency Linear Regulators
- Battery Chargers

ORDERING INFORMATION

Device	Package
TPS7A7002DP	SOP8-PP

* Refer to the ordering information for the details.

DESCRIPTION

The TPS7A7002 series of high performance ultra-low dropout linear regulators operates from 2.5V to 5.5V input supply and provides ultra-low dropout voltage, high output current with low ground current. Wide range of preset output voltage options are available. These ultra-low dropout linear regulators respond fast to step changes in load which makes them suitable for low voltage micro-processor applications. The TPS7A7002 is developed on a CMOS process technology which allows low quiescent current operation independent of output load current. This CMOS process also allows the TPS7A7002 to operate under extremely low dropout conditions.

ABSOLUTE MAXIMUM RATINGS (Note 1)

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Input Supply Voltage (Survival)	V_{IN}	-	6.5	V
Maximum Output Current	I_{MAX}	-	3	A
Lead Temperature (Soldering, 5 sec)	T_{SOL}		260	°C
Storage Temperature Range	T_{STG}	-65	150	°C
Operating Junction Temperature Range	T_{JOPR}	-40	125	°C
Package Thermal Resistance*	$\Theta_{JA\text{-}SOP8\text{-}PP}$	68		°C/W

* Calculated from package in still air, mounted to 2.6mm X 3.5mm(minimum foot print) 2 layer PCB without thermal vias per JESD51 standards.

Please contact us for more information about this product.

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Site Web : www.es-france.com

4.0A Low Output Voltage Ultra LDO Regulator TJ2134

FEATURES

- Works with 1.1V ~ 3.6V V_{IN}
- Ultra Low Dropout Voltage
- Low Quiescent Current
- Excellent Line and Load Regulation
- Guaranteed Output Current of 4.0A
- Adjustable Output Voltage Down to 0.8V
- V_{OUT} Power OK Signal (A version Only)
- Programmable Soft-Start (A version Only)
- Logic Controlled Shutdown Option
- Over-Temperature/Over-Current Protection
- -40˚C to 125˚C Junction Temperature Range

APPLICATION

- Motherboards and Graphic Cards
- Microprocessor and Chipset Power Supplies
- Peripheral Cards / Low Voltage Digital ICs
- High Efficiency Linear Regulators
- SMPS Post Regulators

DESCRIPTION

The TJ2134 is a 4.0A high performance ultra low-dropout linear regulator ideal for powering core voltages of low-power microprocessors. The TJ2134 implements a dual supply configuration allowing for very low output impedance. The TJ2134 requires a bias input supply and a main input supply, allowing for ultra-low input voltages on the main supply rail. The input supply operates from 1.3V to 3.6V and the bias supply requires between 2.9V and 5.5V for proper operation. The Soft-Start reduces inrush current of the load capacitors and minimizes stress on the input power source during start-up. The TJ2134 delivers high current and ultra-low-dropout output voltage as low as 0.8V for applications where V_{OUT} is very close to V_{IN}. The TJ2134 is developed on a CMOS technology which allows low quiescent current operation independent of output current. This technology also allows the TJ2134 to operate under extremely low dropout conditions.

SOP8-PP

ORDERING INFORMATION

Device	Package
TJ2134GDP	SOP8-PP
TJ2134AGDP	SOP8-PP

OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Recommend Operating Input Voltage	V_{IN}	1.3	3.6	V
Recommend Operating Bias Voltage	V_{BIAS}	V_{OUT}+2.1	5.5	V
Enable Input Voltage	V_{EN}	0	5.5	V
Operating Junction Temperature Range	T_{JOPR}	-40	125	˚C
Package Thermal Resistance*	$\Theta_{JA\text{-}SOP8\text{-}PP}$	68		˚C/W
	$\Theta_{JC\text{-}SOP8\text{-}PP}$	15		

* Calculated from package in sill air, mounted to minimum foot print 2 layer PCB without thermal via per JESD51 standards.

Please contact us for more information about this product.

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