WR3006

3A，Ultra-Low Dropout LDO

1. General Description

The WR3006 is an adjustable output voltage, low dropout CMOS Linear regulator with POK function. The WR3006 needs two supply voltages, one is a bias voltage (VDD) for internal control circuitry, the other is a main supply voltage (V_{IN}) for power conversion, to reduce power dissipation and provide extremely low dropout voltage. The WR3006 can source 3A of output current with a bias voltage range of 3.0 V to 5.5 V, a main supply voltage range of 1.2 V to 5.5 V, and an adjustable output, making the device can be used for a wide variety of applications. Low-dropout voltage and low quiescent current make this series of devices ideal for a wide selection of battery-operated handheld equipment. The WR3006 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. All device versions have thermal shutdown and current limit for safety.

The devices offer a new level of cost-effective performance in cellular phones, laptop and notebook computers, and other portable devices.

The WR3006 regulators is available in standard DFN3030-10 package. Standard products are Pb-free and Halogen-free.

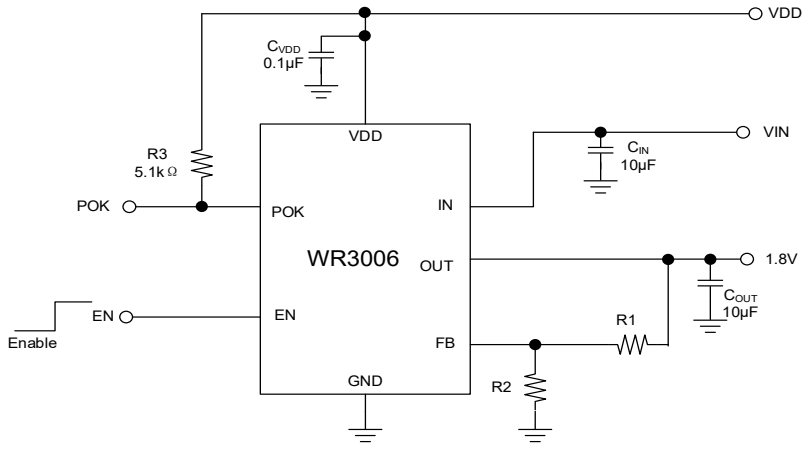
2. Features

- PSRR: 60dB@1KHz
- Output Current: 3A
- V_{IN} Input Voltage: 1.2V~5.5V
- V_{DD} Input Voltage: 3.0V~5.5V
- Adjustable Output Voltage
- Dropout Voltage: 150mV @ I_{OUT} = 3A
- Quiescent Current: 100μA (Typical)
- V_{IN} Shut-down Current: < 1μA
- VDD Shut-down Current: < 3μA
- Operating Temperature: -40~+85ºC
- Built-In Fold Back Protection Circuit
- Shutdown/Enable Control Function

3. Applications

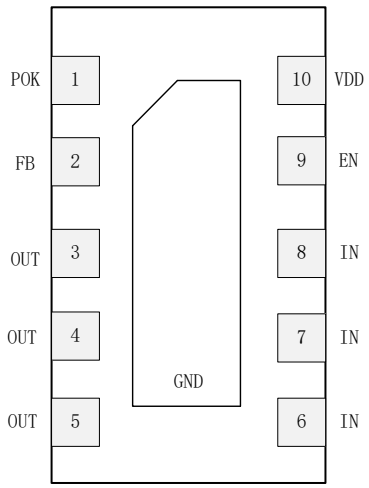
- Front Side Bus VTT(1.2V/3A)
- Note Book PC Applications
- Motherboard Applications

4. Typical Application



$$V_{OUT}=V_{REF}(1+R1/R2)$$

5. Pin Configuration



DFN3030-10L

6. Pin Description

PIN NUMBER	PIN NAME	I/O	PIN FUNCTIONS
4	FB		Voltage Feedback Pin. Connecting this pin to an external resistor divider receives the feedback voltage of the regulator.
1,2,3	OUT	O	Output pin of the regulator. Connecting this pin to load and output capacitors is required for stability and improving transient response. The output voltage is programmed by the resistor-divider connected to FB pin. The V_{OUT} can provide 3A (max.) load current to loads. During shutdown, the output voltage is quickly discharged by an internal pull-low MOSFET.
7,8,9	IN	I	Main supply input pin for voltage conversions. A decoupling capacitor is usually connected near this pin to filter the voltage noise and improve transient response. The voltage on this pin is monitored for Power-On-Reset purpose
10	V_{DD}		Bias voltage input pin for internal control circuitry. Connect this pin to a voltage source (+5V recommended). A decoupling capacitor is usually connected near this pin to filter the voltage noise. The voltage at this pin is monitored for Power-On-Reset purpose.
5	POK	O	Power-OK signal output pin. This pin is an open-drain output used to indicate the status of output voltage by sensing FB voltage. This pin is pulled low when output voltage is not within the Power-OK voltage window.
6	EN	I	Active-high enable control pin. Applying and holding the voltage on this pin below the enable voltage threshold shuts down the output. When re-enabled, the IC undergoes a new soft-start process. When leave this pin open, an internal pull-up/low current pulls the EN voltage and enables/shuts down the regulator.
Exposed Pad	GND		Ground pin of the circuitry. Connect the exposed pad to the system ground plan with large copper area for dissipating heat into the ambient air.

7. Absolute Maximum Ratings[1]

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{IN}	V_{IN} Supply Voltage (V_{IN} to GND)	-0.3	6	V
V_{DD}	V_{DD} Supply Voltage (V_{DD} to GND)	-0.3	6	V
V_{OUT}	V_{OUT} to GND Voltage	-0.3	V_{IN}+0.3	V
	POK to GND Voltage	-0.3	6	V
	EN, FB to GND Voltage	-0.3	V_{DD}+0.3	V
P_D	Power Dissipation, T_A=25℃	1.8		W
$I_{OUT(PK)}$	V_{OUT} Peak Current (<30 μ s)	9		A
T_J	Maximum Junction Temperature	150		°C
T_{STG}	Storage Temperature	-65	150	°C
T_{SDR}	Maximum Lead Soldering Temperature, 10 Seconds	260		°C
ESD	HBM	8000		V

NOTE [1]: Stresses beyond those listed under Absolute maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. All voltage values are with respect to the network ground terminal unless otherwise noted.

8. Recommended Operating Conditions

SYMBOL	PARAMETER		MIN	TYP	MAX	UNIT
V_{DD}	V_{DD} Supply Voltage		3.0	-	5.5	V
V_{IN}	V_{IN} Supply Voltage		1.2	-	5.5	V
V_{OUT}	V_{OUT} Output Voltage (When V_{DD}-V_{OUT}>1.9V)		-0.3	-	V_{IN}+0.3	V
I_{OUT}	V_{OUT} Output Current	Continuous Current	0	-	3	A
		Peak Current	0	-	4	
C_{OUT}	V_{OUT} Output Capacitance	V_{OUT}＜1.4V	22	-	-	μF
		V_{OUT}≥1.4V	10	-	-	
$ESRC_{OUT}$	ESR of output apacitor		0	-	200	mΩ
T_A	Ambient Temperature		-40	-	85	°C
T_J	Junction Temperature		-40	-	125	°C

9. Electrical Characteristics (V_{DD} = 5V, V_{IN} = 1.8V, V_{OUT} = 1.2V, I_{OUT}=1mA, C_{IN}=10μF, C_{OUT}=22μF, V_{EN}= V_{DD}, T_A=25°C, unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
SUPPLY CURRENT							
I_{VDD}	V_{DD} Supply Current	EN = High, I_{OUT}=0A		-	100	120	μA
I_{SD}	V_{DD} Supply Current at Shutdown	EN = Low		-	-	3	μA
	V_{IN} Supply Current at Shutdown	EN = Low		-	-	1	μA
POWER-ON-RESET (POR)							
V_{DDH}	Rising V_{DD} POR Threshold	V_{DD} Rising		2.5	2.7	2.9	V
Hysteresis	V_{DD} POR Hysteresis			-	0.4	-	V
V_{UVLO}	Rising V_{IN} POR Threshold	V_{IN} Rising		0.8	0.9	1.0	V
Hysteresis	V_{IN} POR Hysteresis			-	0.5	-	V
OUTPUT VOLTAGE							
V_{REF}	Reference Voltage	FB=V_{OUT}		-	0.8	-	V
V_{OUT}	Output Voltage Accuracy	V_{DD}=3.0 ~ 5.5V, I_{OUT}= 0~3A		-1.5	-	+1.5	%
LDR	Load Regulation	I_{OUT}=0A ~3A		-	3	-	mV
LNR	Line Regulation	I_{OUT}=10mA, V_{DD}= 3.0 ~ 5.5V		-0.15	-	+0.15	%/V
R_{DIS}	V_{OUT} Pull-low Resistance	V_{DD}=5V, V_{EN}=0V, V_{OUT}<0.8V		-	85	-	Ω
I_{FB}	FB Input Current	V_{FB}=0.8V		-100	-	100	nA
DROPOUT VOLTAGE							
V_{DROP}	V_{IN}-to-V_{OUT} Dropout Voltage	V_{DD}=5.0V, I_{OUT}=3A	V_{OUT}=2.5V	-	0.19	0.24	V
			V_{OUT}=1.8V	-	0.16	0.21	
			V_{OUT}=1.2V	-	0.15	0.20	
I_{LIM}	Current-Limit Level	T_J=25°C		4.0	5.7	6.7	A

SYMBOL	PARAMETER	TES CONDITIONS	MIN	TYP	MAX	UNIT
PROTECTIONS						
I_{SHORT}	Short Current-Limit Level	V_{FB}<0.2V	-	1.3	-	A
	Short Current-Limit Blanking Time	From beginning of soft-start	0.6	1.5		ms
T_{SD}	Thermal shutdown temperature	Shutdown, temperature increasing	-	160	-	°C
		Reset, temperature decreasing	-	50	-	°C
ENABLE AND SOFT-START						
V_{ENH}	EN Logic High Threshold Voltage	V_{EN} rising	0.5	0.8	1.1	V
	EN Hysteresis		-	0.1	-	V
	EN Pull-High Current	V_{EN}=GND	-	3	-	μ A
	EN Pull-Low Current	V_{EN}=V_{DD}				
t_{SS}	Soft-Start Interval	V_{OUT}=10% to 90%	0.3	0.6	1.2	ms
t_{ON}	Turn On Delay	From being enabled to V_{OUT} rising 10%	260	330	400	μs
POWER-OK AND DELAY						
V_{THPOK}	Rising POK Threshold Voltage	V_{FB} rising	88	90	92	%
	POK Threshold Hysteresis	V_{FB} falling	-	8	-	%
	POK Pull-low Voltage	POK sinks 5mA	-	0.25	0.4	V
	POK Debounce Interval	V_{FB}<falling POK voltage threshold	-	10	-	μs
	POK Delay Time	From V_{FB} =V_{THPOK} to rising edge of the V_{POK}	1	2	4	ms

10. Typical Performance Characteristics

(V_{DD} = 5V, V_{IN} = 1.8V, V_{OUT} = 1.2V, I_{OUT}=1mA, C_{IN}=10μF, C_{OUT}=22μF, V_{EN}= V_{DD}, T_A=25°C, unless otherwise noted)

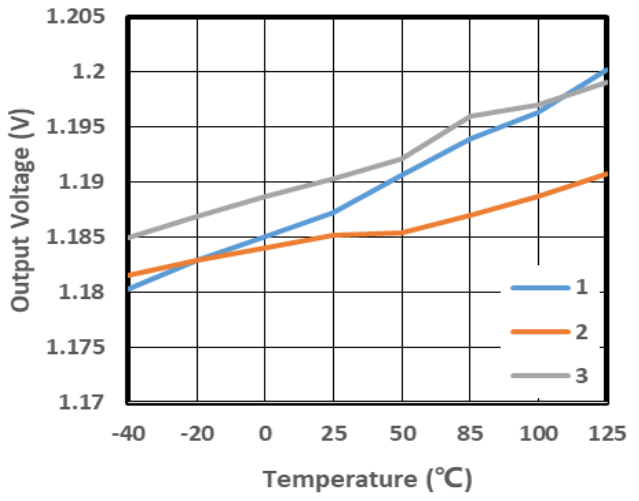


Figure 1. WR3006-AFEAR

Output Voltage vs. Ambient Temperature

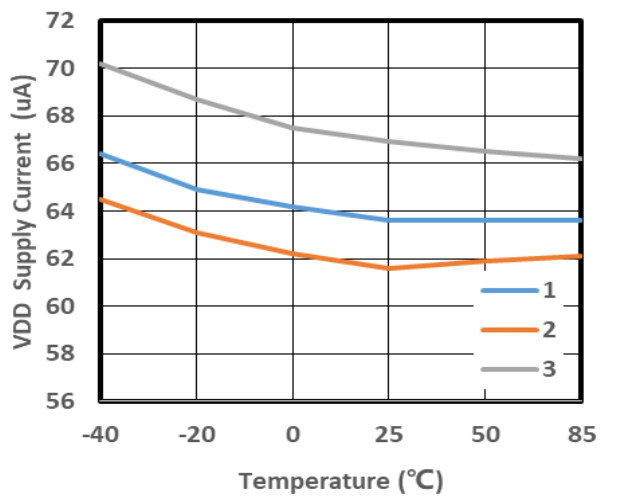


Figure 2. WR3006-AFEAR

Supply Current vs. Ambient Temperature

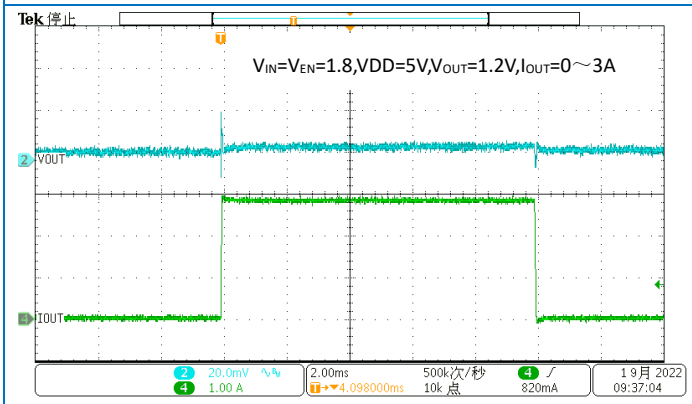


Figure 3. Load Transient

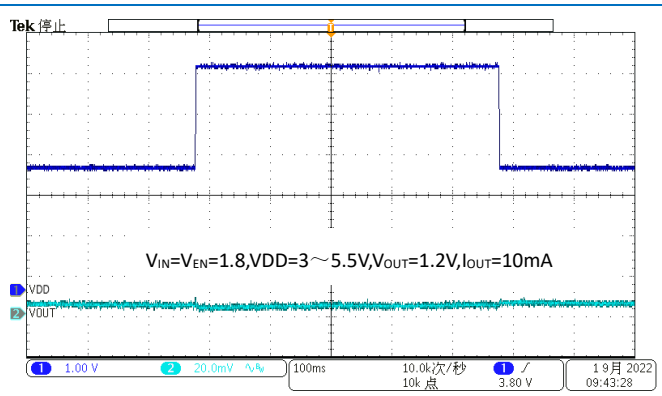


Figure 4. Line Transient

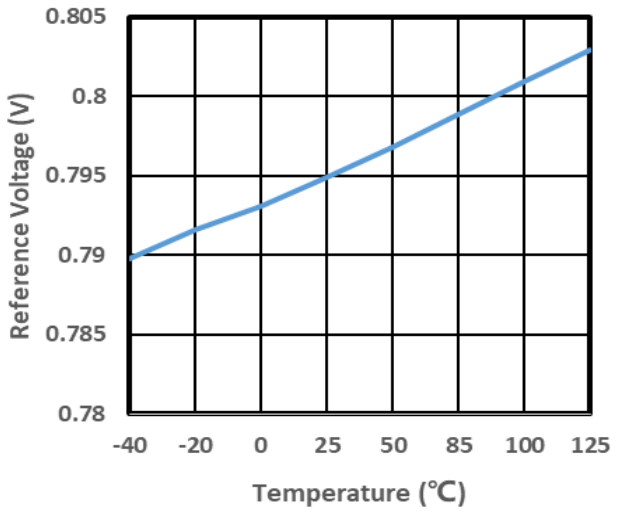


Figure 5. WR3006-AFEAR

Reference Voltage vs. Ambient Temperature

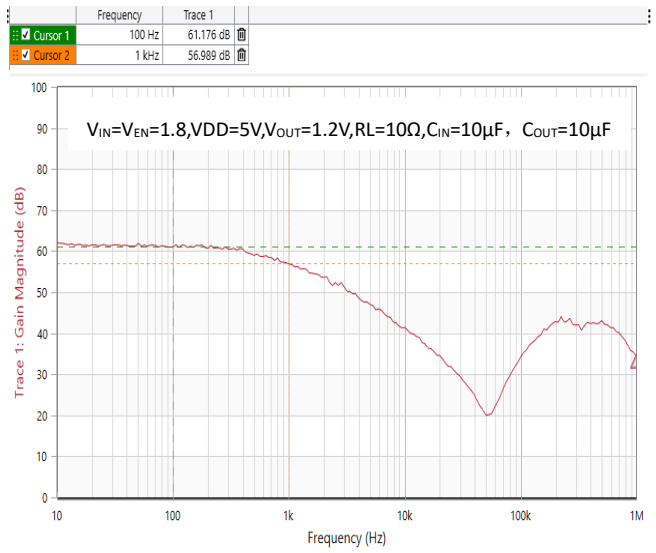


Figure 6. PSRR(VIN)

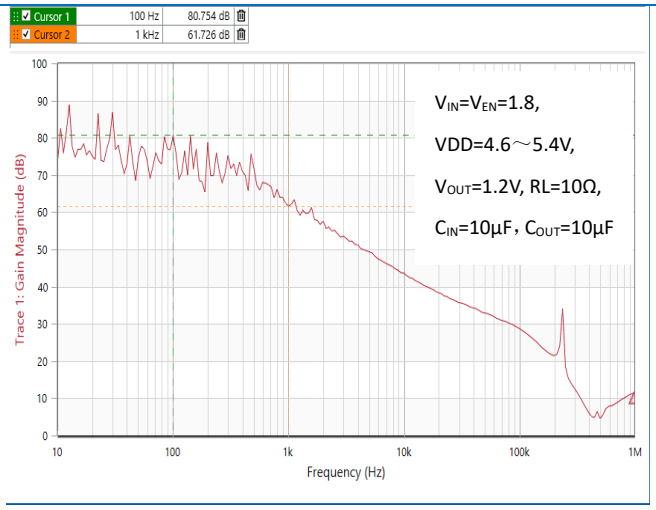


Figure 7. PSRR(VDD)

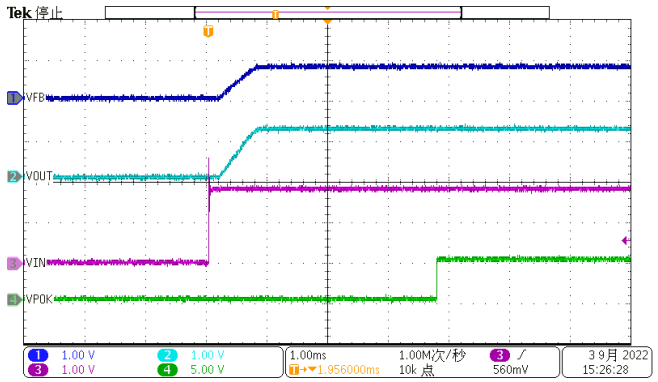


Figure 8. Power On

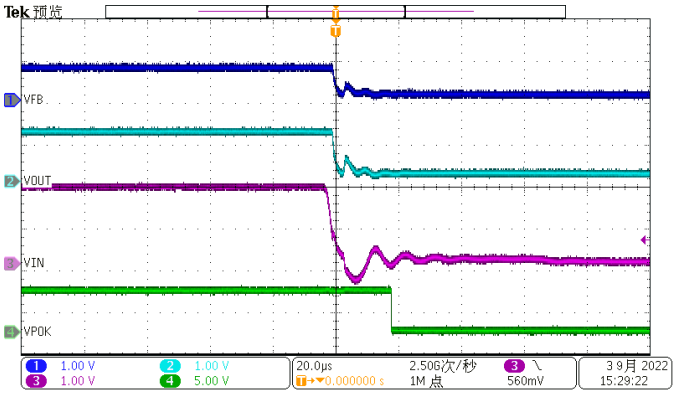


Figure 9. Power Off

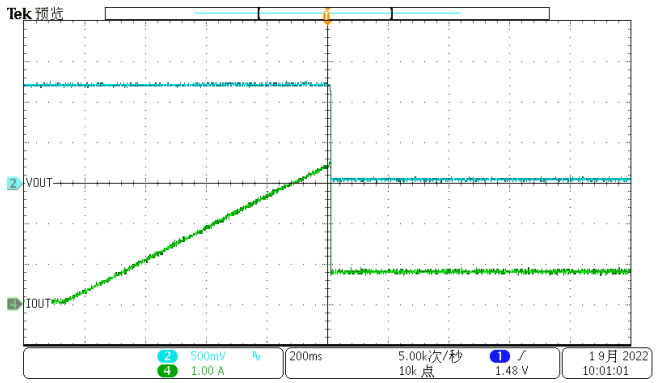


Figure 10. Over Current Protection

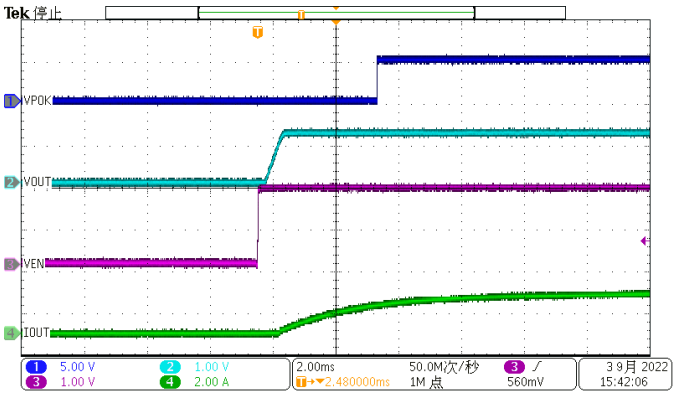


Figure 11. EN Setup

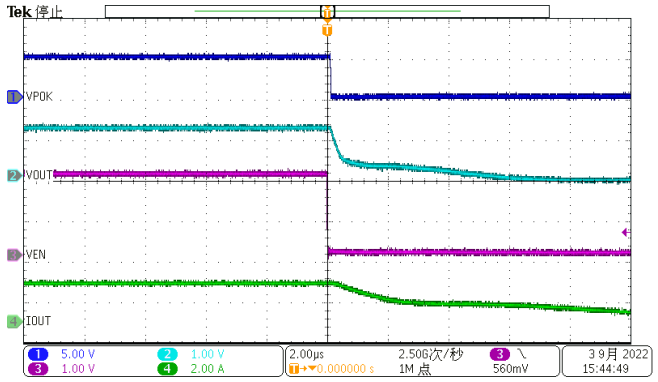
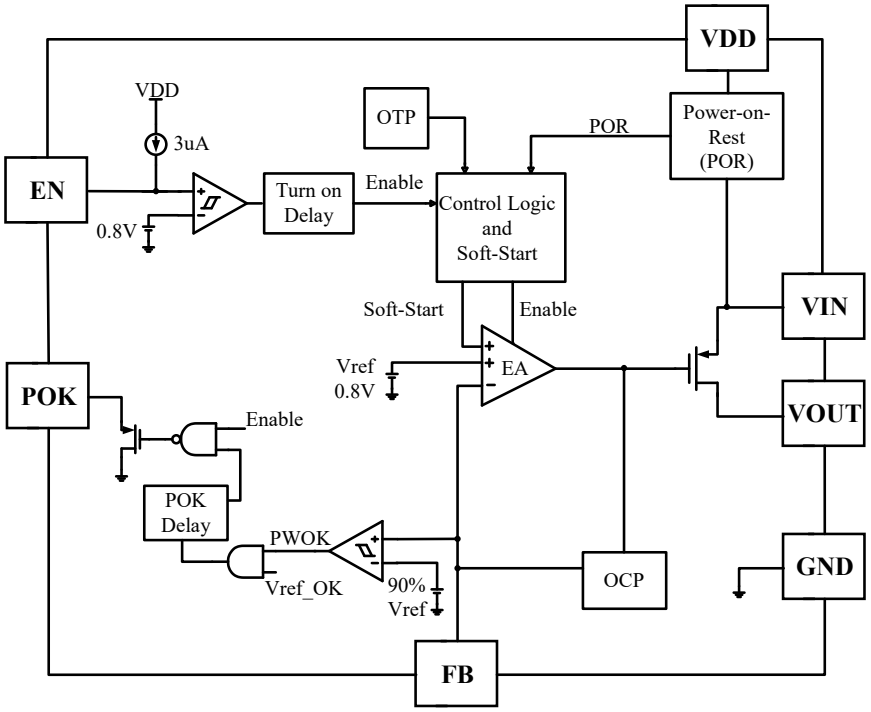


Figure 12.EN Shutdown

11. Function Description

11.1 Block Diagram



12. Naming Conventions

WR AA BB-X DDD E

WR: WAYON Regulator

AA: 30 - Output Current, 3 A

BB: Serial number

X:

A: Active High/Initial On

B: Active Low/Initial On

C: Active High/Initial Off

D: Active Low/Initial Off

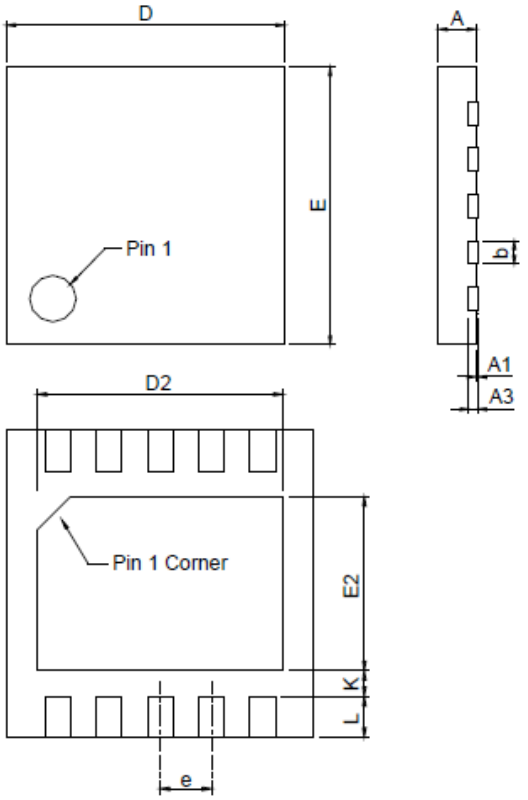
DDD: P80-Package, SOP-8P

FEA-Package, TDFN3*3-10

E: R-Reel & T-tube

13. Package Information

DFN(3.03.0*0.75)-10L



SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	2.60	2.80	3.00
A1	1.50	1.60	1.70
B		0.95BSC	
B1		1.90BSC	
C	0.25	0.40	0.50
D	2.82	2.92	3.02
E	0.10	0.15	0.20
F	0.00	0.08	0.15
L		0.59REF	
F1	0.90	1.10	1.30
L1	0.30	0.45	0.60

14. Ordering Information

Part Number	Initial State	Package	Packing Quantity	Marking
WR3006-AP80R	Active High/Initial On	SOP-8P	4k/Reel	WR3006 A XXXX
WR3006-BP80R	Active Low/Initial On	SOP-8P	4k/Reel	WR3006 B XXXX
WR3006-CP80R	Active High/Initial Off	SOP-8P	4k/Reel	WR3006 C XXXX
WR3006-DP80R	Active Low/Initial Off	SOP-8P	4k/Reel	WR3006 D XXXX
WR3006-AFEAR	Active High/Initial On	TDFN3*3-10	3k/Reel	WR3006 A XXXX
WR3006-BFEAR	Active Low/Initial On	TDFN3*3-10	3k/Reel	WR3006 B XXXX
WR3006-CFEAR	Active High/Initial Off	TDFN3*3-10	3k/Reel	WR3006 C XXXX
WR3006-DFEAR	Active Low/Initial Off	TDFN3*3-10	3k/Reel	WR3006 D XXXX

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For additional information, please contact your local Sales Representative.

Specifications are subject to change without notice.
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.
Users should verify actual device performance in their specific applications.