ET633XX - Ultra-Low IQ 300mA LDO

General Description

The ET633XX series of CMOS low dropout regulators are designed specifically for portable battery-powered applications which require ultra-low quiescent current. The ultra-low consumption of type 0.6uA ensures long battery life and dynamic transient boost feature improves device transient response for wireless communication applications.

The device is available in small DFN4(1mm ×1mm) or SOT23-5 packages.

Features

- Operating Input Voltage Range From 2.2V to 5.5V
- Output Voltage Range From 1.1V to 3.6V (0.05V Steps)
- Ultra-Low Quiescent Current Typical 0.6uA
- Low Dropout is Typical 450mV at 300mA@V_{OUT}=1.8V
- High Output Voltage Accuracy ±2%
- Stable with Ceramic Capacitors 1uF
- Over-Current Protection
- Thermal Shutdown Protection
- Available in Small DFN4 (1mm × 1mm) Packages
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant
- Package Information:

Part No.	Package	MSL
ET633XXYB	DFN4 (1×1)	Level 1
ET633XXB	SOT23-5	Level 3

Applications

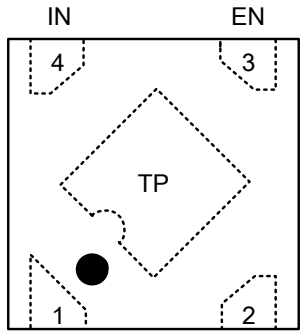
- Battery Powered Equipments
- Portable Communication Equipments
- Cameras, Image Sensors and Camcorders
- Label Information

Device Information

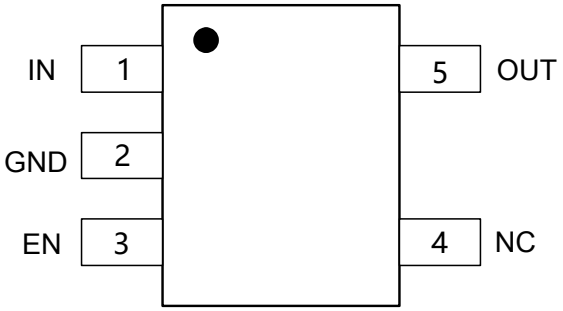
ET 633 XX X B

XX Output Voltage		**X** Package		**B** Auto-Discharging Function	
Fixed	1.1~3.6V (0.05V Steps)	/	SOT23-5	B	With Auto-discharge
		Y	DFN4(1×1)		

Pin Configuration



DFN4 (Top View)

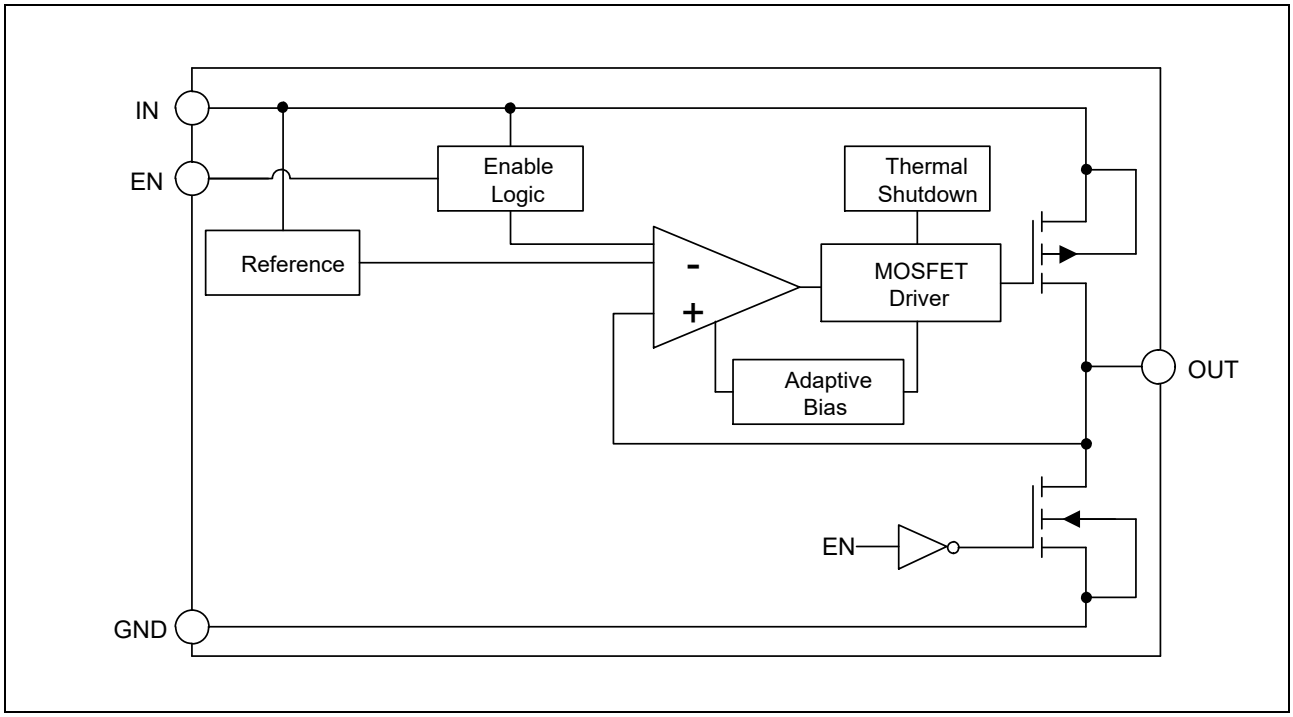


SOT23-5 (Top View)

Pin Function

Pin NO.		**Symbol**	**Pin Description**
DFN4	**SOT23-5**		
1	5	OUT	Output Pin
2	2	GND	Power Supply Ground
3	3	EN	Chip Enable Pin (Active “H”)
4	1	IN	Power Supply Input Voltage
TP	4	Thermal Pad / NC	Thermal pad for DFN4(1×1) package, connect to GND or leave floating. Do not connect to any potential other than GND. NC for SOT23-5 no connection.

Block Diagram



Functional Description

The ET633XX is a high performance 300mA Linear Regulator with Ultra Low IQ. This device delivers low Noise and high Power Supply Rejection Ratio with excellent dynamic performance due to employing the Dynamic Quiescent Current adjustment which assure ultra low I_Q consumption at no-load state. These parameters make this device very suitable for various battery powered applications.

Input Decoupling

It is recommended to connect at least a 1μF 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. The good input capacitor will limit the influence of input trace inductances and source resistance during sudden load current changes.Higher capacitance and lower ESR Capacitors will improve the overall line transient response.

Output Decoupling

The ET633XX does not require a minimum Equivalent Series Resistance (ESR) for the output capacitor. The X5R and X7R types have the lowest capacitance variations over temperature thus they are recommended.

There is recommended connect the output capacitor as close as possible to the output pin of the regulator.

Enable Operation

The ET633XX 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 0.4V the device is guaranteed to be disable. The active discharge transistor at the devices with Active Discharge Feature is activated and the output voltage V_{OUT} is pulled to GND through an internal circuitry with effective resistance about 45Ω.

If the EN pin voltage is higher than 1.2V the device is guaranteed to be enabled. The internal active discharge circuitry is switched off and the desired output voltage is available at output pin. In case the Enable function is

not required the EN pin should be connected directly to input pin.

Current Limit Protection

When output current at the OUT pin is higher than current limit threshold, the current limit protection will be triggered and clamp the output current to approximately 300mA to prevent over-current and to protect the regulator from damage due to overheating.

Thermal Shutdown

When the die temperature exceeds the Thermal Shutdown point (T_{TSD} = 155°C typical) the device goes to disabled state and the output voltage is not delivered until the die temperature decreases to 130°C. The Thermal Shutdown feature provides a protection 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 ET633XX device can handle is given by:

$$P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA}$$

Absolute Maximum Ratings

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage (1)	6.0	V
V_{OUT}	Output Voltage	-0.3 to V_{IN} + 0.3	V
V_{CE}	Chip Enable Input	-0.3 to 6.0	V
$T_{J(MAX)}$	Maximum Junction Temperature	150	°C
T_{STG}	Storage Temperature	-65 to 150	°C
V_{ESD}	Human Body Model (2)	±2000	V
	Charged Device Model (2)	±1500	V
I_{LU}	Latch up Current Maximum Rating (2)	±200	mA

Note1: Refer to ELECTRICAL CHARACTERISTIS for Safe Operating Area.

Note2: This device series incorporates ESD protection and is tested by the following methods:

- ESD Human Body Model tested per EIA/JESD22-A114
- ESD Charged Device Model tested per JESD22-C101
- Latch up Current Maximum Rating tested per JEDEC78.

Thermal Characteristics

Symbol	Package	Parameters	Value	Unit
$R_{\theta JA}$	DFN4	Thermal Resistance, Junction-to-Air	312	°C/W
	SOT23-5		300	
P_{DMAX}	DFN4	Power Dissipation	400	mW
	SOT23-5		450	

Recommended Operating Conditions

Symbol	Parameters	Rating	Unit
V_{IN}	Input Voltage	2.2 to 5.5	V
I_{OUT}	Output Current	0 to 150	mA
T_A	Operating Ambient Temperature	-40 to 85	ºC
T_J	Operating Junction Temperature	-40 to 85	ºC
C_{IN}	Effective Input Ceramic Capacitor Value	0.47 to 4.7	µF
C_{OUT}	Effective Output Ceramic Capacitor Value	0.47 to 4.7	µF
ESR	Input and Output Capacitor Equivalent Series Resistance (ESR)	5 to 100	mΩ

Electrical Characteristics

VOLTAGE VERSION 1.1V

(V_{IN} = 2.5V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	1.078	1.10	1.122	V
Reg_{LINE}	Line Regulation	2.5V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 2.5V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA (4) (6)			1100	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A = 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pin Current	V_{EN} ≤ V_{IN} ≤ 5.5V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 2.5V + 200mVpp Modulation I_{OUT} =150mA(5)		55		dB
e^N	Output Noise Voltage	V_{IN} =2.5V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF (5)		55		μV_{RMS}
R_{LOW}	Active Output Discharge Resistance	V_{IN} = 4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing From T_A= +25°C(5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		25		°C

VOLTAGE VERSION 1.2 V

(V_{IN} = 2.5V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	1.176	1.20	1.224	V
Reg_{LINE}	Line Regulation	2.5V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 2.5V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA (4) (6)			1000	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, TA = 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pin Current	V_{EN} ≤ V_{IN} ≤ 5.5 V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 2.5V + 200mVpp Modulation I_{OUT} =150mA (5)		55		dB
e^N	Output Noise Voltage	V_{IN} =2.5V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF (5)		55		μV_{RMS}
R_{LOW}	Active Output Discharge Resistance	V_{IN} = 4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing from T_A= +25°C (5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		25		°C

VOLTAGE VERSION 1.5V

(V_{IN} = 2.5V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	1.47	1.50	1.53	V
Reg_{LINE}	Line Regulation	2.5V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 4.3V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA (4) (6)			700	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A= 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pin Current	V_{EN} ≤ V_{IN} ≤ 5.5 V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 2.5V + 200mVpp Modulation I_{OUT} = 150mA(5)		55		dB
e^N	Output Noise Voltage	V_{IN} = 2.5V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF (5)		60		μV_{RMS}
R_{LOW}	Active Output Discharge Resistance	V_{IN} =4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing From T_A = +25°C (5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		25		°C

VOLTAGE VERSION 1.8 V

(V_{IN} = 2.8V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	1.764	1.80	1.836	V
Reg_{LINE}	Line Regulation	2.8V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 2.8V		5	20	mV
V_{DROP}	Dropout Voltage	IOUT = 300mA (4) (6)		450	600	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A= 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pull Down Current	V_{EN} ≤ V_{IN} ≤ 5.5 V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 2.8V + 200mVpp Modulation I_{OUT} = 150mA(5)		55		dB
e^N	Output Noise Voltage	V_{IN} = 2.8V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF(5)		70		μV_{RMS}
R_{LOW}	Active Output Discharge Resistance	V_{IN} =4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing from T_A = +25°C (5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		20		°C

VOLTAGE VERSION 2.5 V

(V_{IN} = 3.5V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	2.45	2.50	2.55	V
Reg_{LINE}	Line Regulation	3.5V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 3.5V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA (4) (6)		380	530	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A= 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pull Down Current	V_{EN} ≤ V_{IN} ≤ 5.5 V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 3.5V + 200mVpp Modulation I_{OUT} = 150mA (5)		45		dB
e^N	Output Noise Voltage	V_{IN} = 3.5V, I_{OUT} = 1mA , f = 10Hz to 100KHz, C_{OUT} = 1μF(5)		85		μV_{RMS}
R_{LOW}	Active Output Discharge Resistance	V_{IN} =4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing from T_A = +25°C (5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		20		°C

VOLTAGE VERSION 2.8 V

(V_{IN} = 3.8V; I_{OUT} =1mA, C_{IN} = C_{OUT} =1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	2.744	2.80	2.856	V
Reg_{LINE}	Line Regulation	3.8V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA≤ I_{OUT} ≤ 300mA, V_{IN} = 3.8V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA (4) (6)		350	500	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A= 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pull Down Current	V_{EN} ≤ V_{IN} ≤ 5.5 V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 3.8V + 200mVpp Modulation I_{OUT} = 150mA(5)		45		dB
e^N	Output Noise Voltage	V_{IN} = 3.8V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF(5)		90		μV_{RMS}
R_{LOW}	Active Output Discharge Resistance	V_{IN} =4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing from T_A = +25°C (5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		20		°C

VOLTAGE VERSION 3.0 V

(V_{IN} = 4.0V; I_{OUT} =1mA, C_{IN} = C_{OUT} =1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) [3]

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	2.94	3.00	3.06	V
Reg_{LINE}	Line Regulation	4.0V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 4V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA [4] [6]		330	480	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A= 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pull Down Current	V_{EN} ≤ V_{IN} ≤ 5.5 V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 4.0V + 200mVpp Modulation I_{OUT} = 150mA[5]		45		dB
e^N	Output Noise Voltage	V_{IN} = 4.0V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF[5]		93		μV_{RMS}
R_{LOW}	Active Output Discharge	V_{IN} =4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing from T_A = +25°C [5]		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD[5]		20		°C

VOLTAGE VERSION 3.3 V

(V_{IN} = 4.3V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.) (3)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating Input Voltage		2.2		5.5	V
V_{OUT}	Output Voltage	−40°C ≤ T_A ≤ 85°C	3.234	3.3	3.366	V
Reg_{LINE}	Line Regulation	4.3V ≤ V_{IN} ≤ 5.5V, I_{OUT} = 1mA		0.05	0.20	%/V
Reg_{LOAD}	Load Regulation	1mA ≤ I_{OUT} ≤ 300mA, V_{IN} = 4.3V		5	20	mV
V_{DROP}	Dropout Voltage	I_{OUT} = 300mA (4) (6)		300	450	mV
I_{LIMIT}	Current Limit	T_A = 25°C	350	600	900	mA
I_{SHORT}	Short Circuit Current Limit	V_{OUT} = 0V	70	170	270	mA
I_Q	Quiescent Current	I_{OUT} = 0mA		0.6	0.9	μA
I_{Q_OFF}	Standby Current	V_{EN} = 0V, T_A= 25°C		0.1	0.5	μA
V_{ENH}	EN Pin Threshold Voltage	EN Input Voltage “H”	1.2			V
V_{ENL}	EN Pin Threshold Voltage	EN Input Voltage “L”			0.4	V
I_{EN}	EN Pull Down Current	V_{EN} ≤ V_{IN} ≤ 5.5V		20	200	nA
PSRR	Power Supply Rejection Ratio	f = 1kHz, V_{IN} = 4.3V + 200mVpp Modulation I_{OUT} = 150mA(5)		45		dB
e^N	Output Noise Voltage	V_{IN} = 4.3V, I_{OUT} = 1mA, f = 10Hz to 100KHz, C_{OUT} = 1μF(5)		95		μV_{RMS}
R_{LOW}	Active Output Discharge	V_{IN} = 4V, V_{EN} = 0V	15	45	90	Ω
T_{TSD}	Thermal Shutdown Temperature	Temperature Increasing from T_A = +25°C (5)		155		°C
T_{SDH}	Thermal Shutdown Hysteresis	Temperature Falling from TSD(5)		20		°C

Note3: Here V_{IN} means internal circuit can work normal. If V_{IN} <V_{OUT}, Output voltage follow V_{IN} (I_{OUT}=1mA), circuit is safety.

Note4: V_{DROP} FT test method: Test the V_{OUT} voltage at V_{SET}+$V_{DROPMAX}$ with 300mA output current.

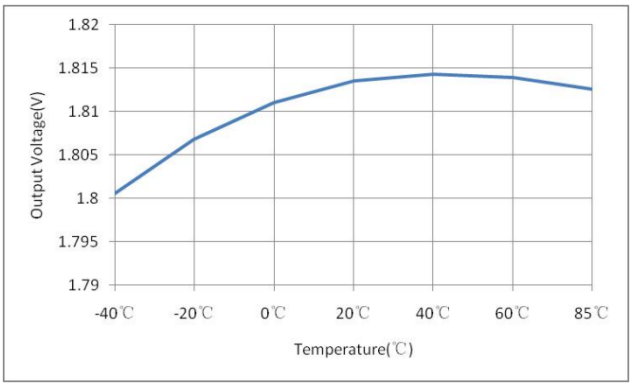
Note5: Guaranteed by design and characterization. Not a FT item.

Note6: The minimum operating voltage is 2.2V.V_{DROP}=V_{IN}(min)-V_{OUT}.

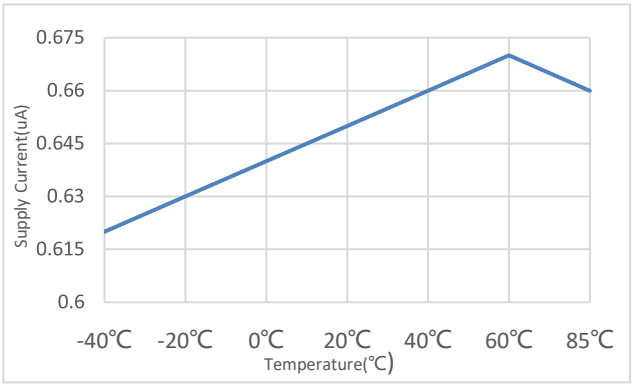
Typical Characteristics

VOLTAGE VERSION 1.8V

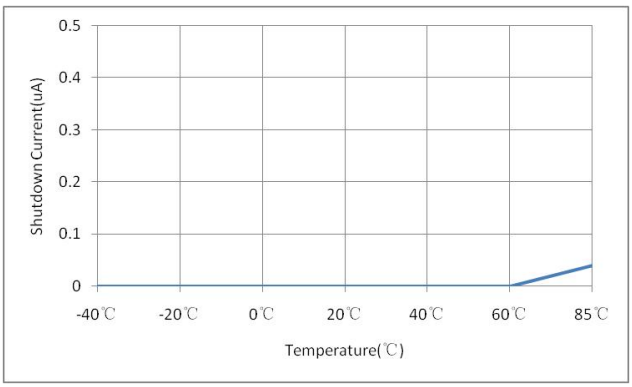
(V_{IN} = 2.8V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.)



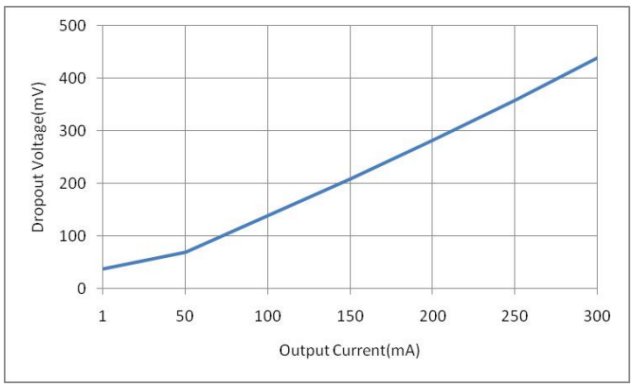
Output Voltage VS Temperature



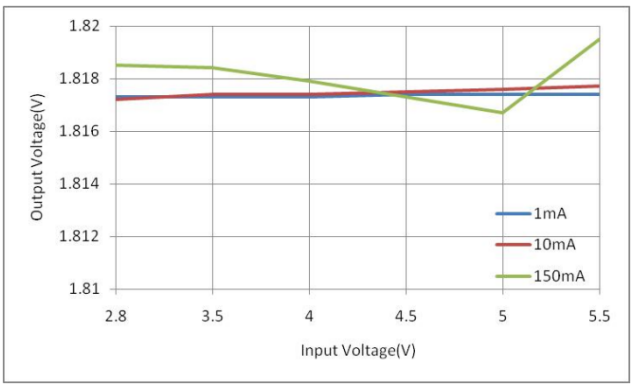
Supply Current VS Temperature



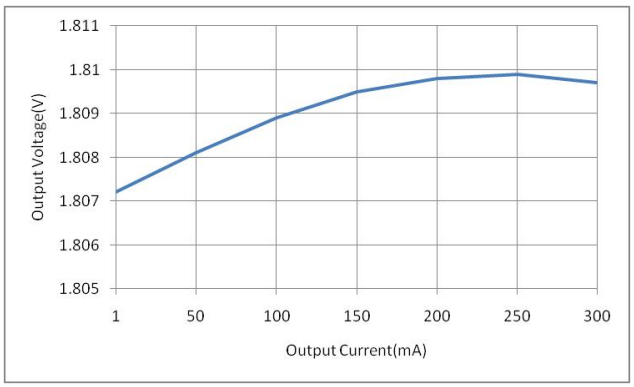
Shutdown Current VS Temperature



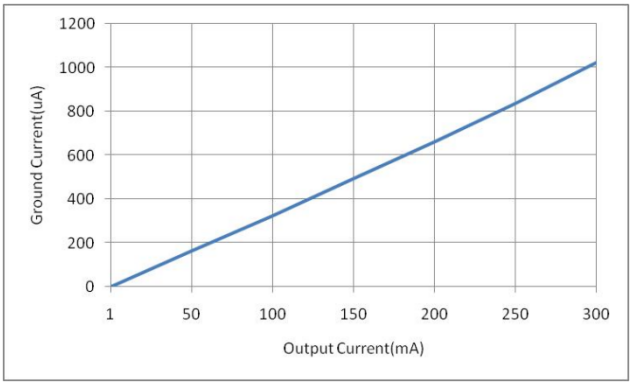
Dropout Voltage VS Output Current



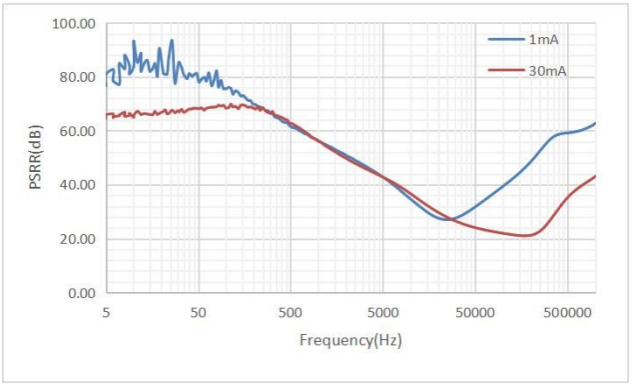
Output Voltage VS Input Voltage



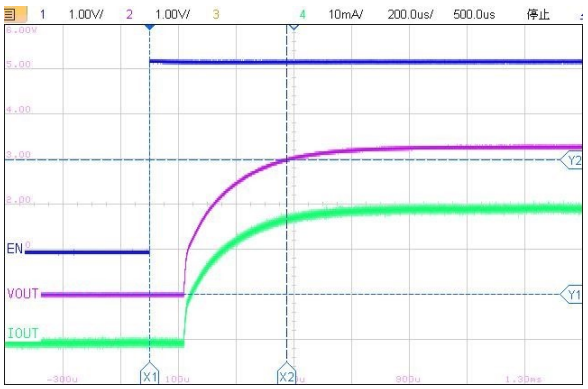
Output Voltage VS Output Current



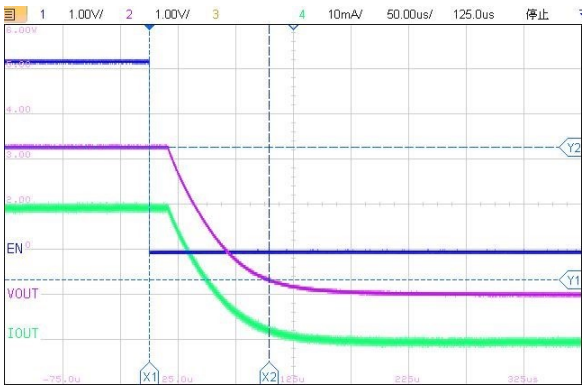
Ground Current VS Output Current



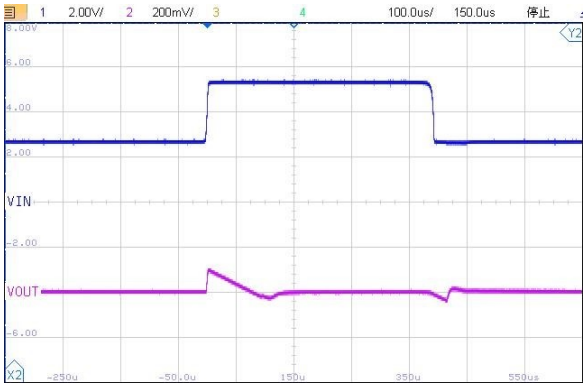
PSRR VS Output Current



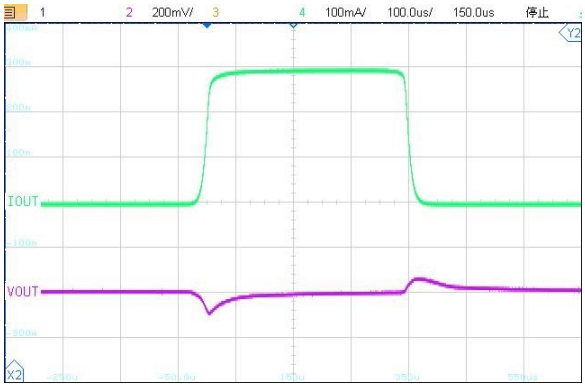
Turn On Speed VS EN Voltage (I_{OUT}=30mA)



Turn Off Speed VS EN Voltage (I_{OUT}=30mA)



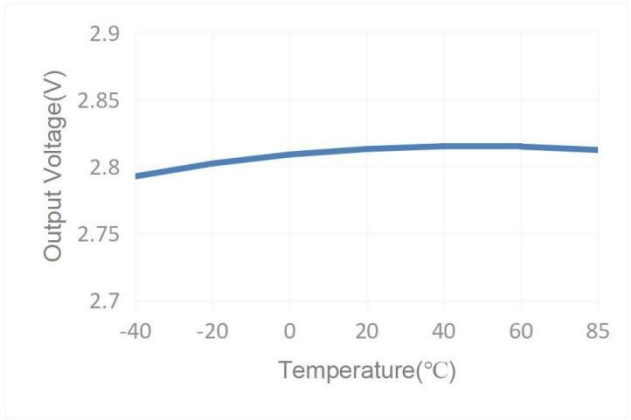
Line Transient Response
V_{IN}=2.8V~5.5V, V_{OUT}=1.8V, I_{OUT}=1mA



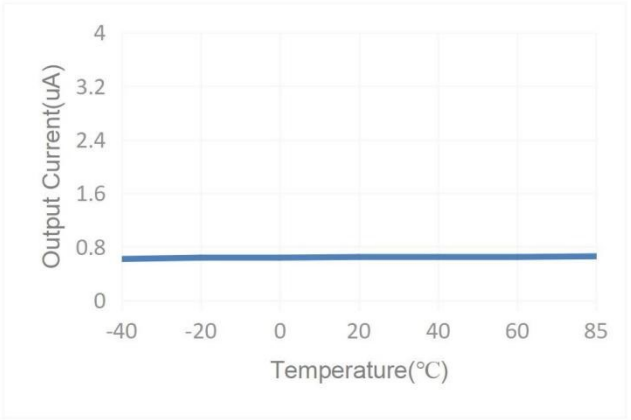
Load Transient Response V_{IN}=2.8V,
V_{OUT}=1.8V, I_{OUT}=1mA~300mA

VOLTAGE VERSION 2.8 V

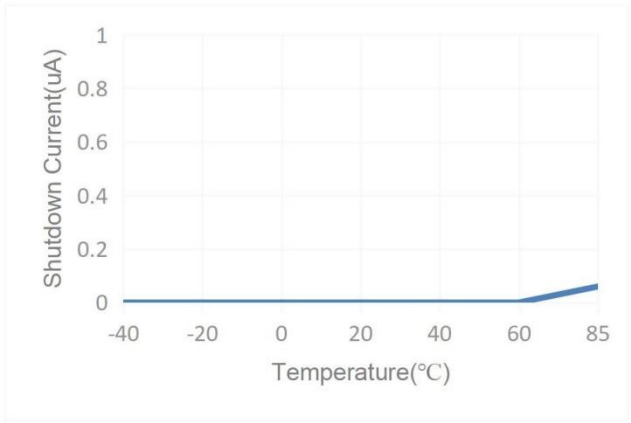
(V_{IN} = 3.8V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.)



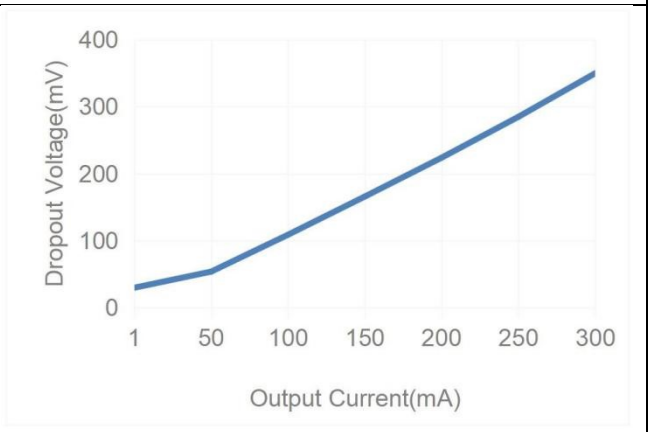
Output Voltage VS Temperature



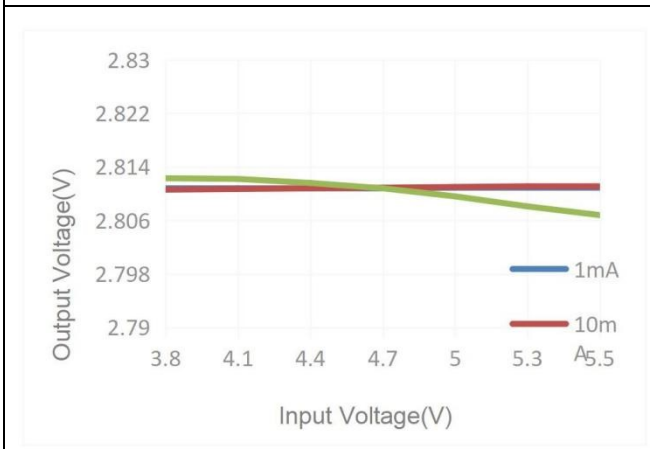
Supply Current VS Temperature



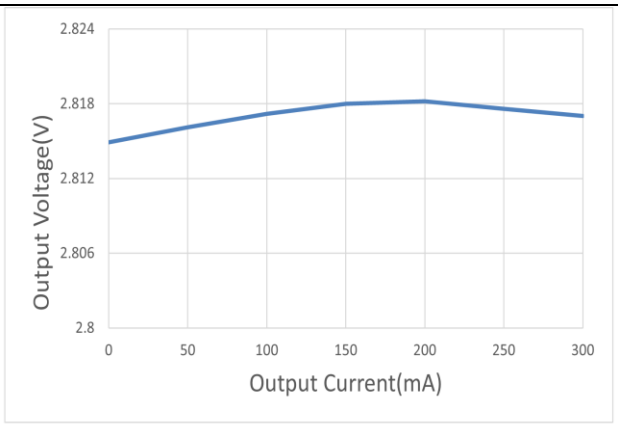
Shutdown Current VS Temperature



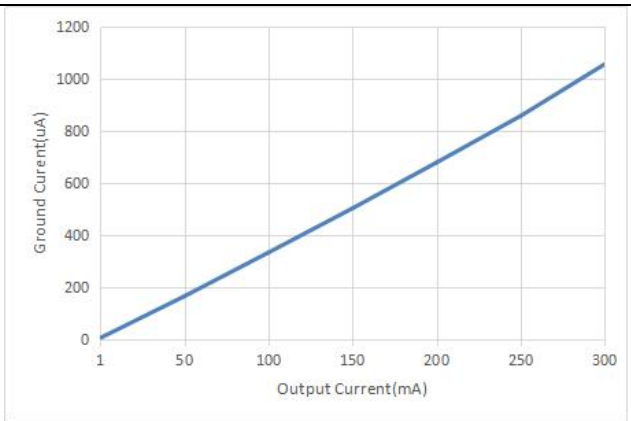
Dropout Voltage VS Output Current



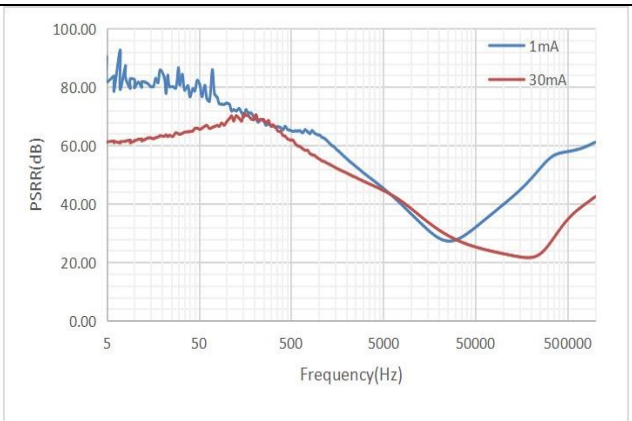
Output Voltage VS Input Voltage



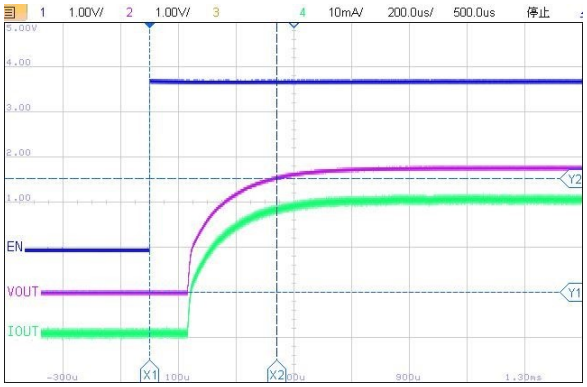
Output Voltage VS Output Current



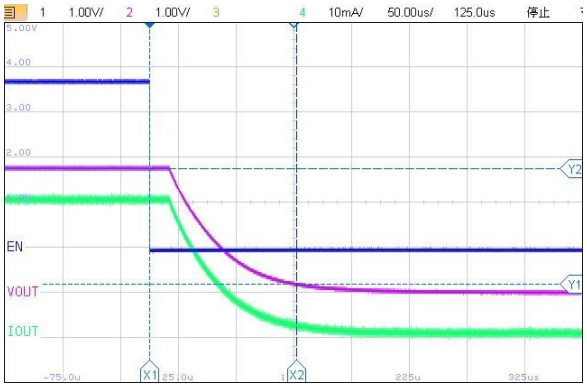
Ground Current VS Output Current



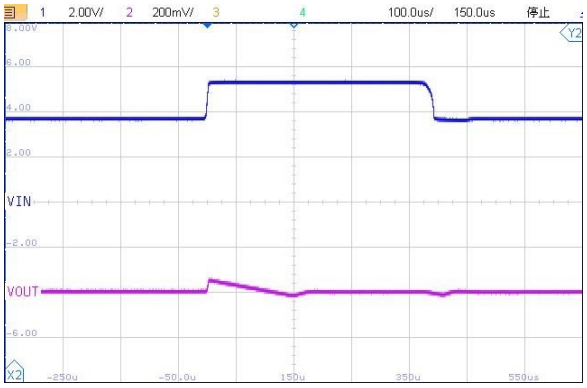
PSRR VS Output Current



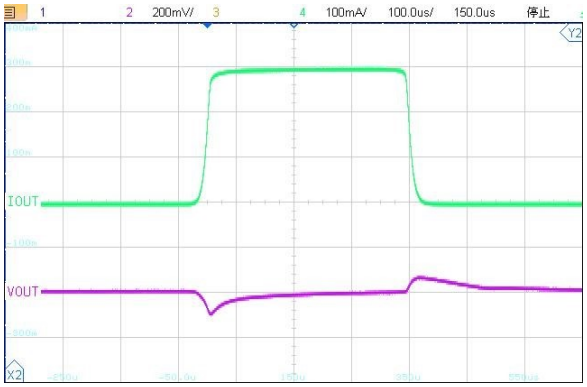
Turn On Speed VS EN Voltage (I_{OUT}=30mA)



Turn Off Speed VS EN Voltage (I_{OUT}=30mA)



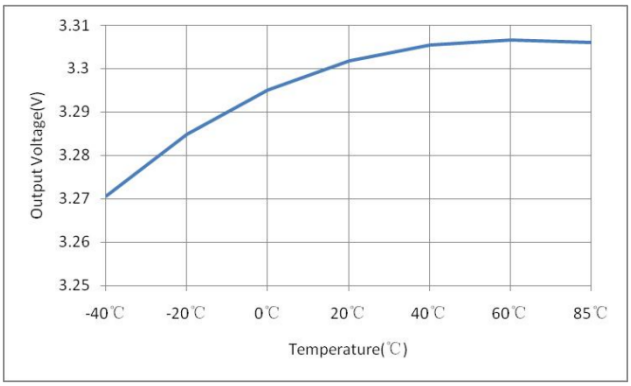
Line Transient Response(I_{OUT}=1mA)
V_{IN}=3.8V~5.5V, V_{OUT}=2.8V, I_{OUT}=1mA



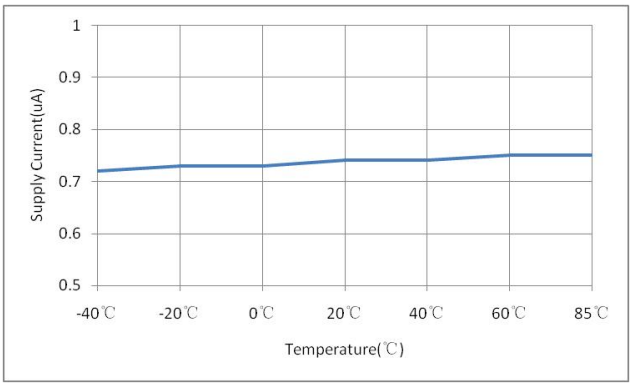
Load Transient Response V_{IN}=3.8V,
V_{OUT}=2.8V, I_{OUT}=1mA~300mA

VOLTAGE VERSION 3.3 V

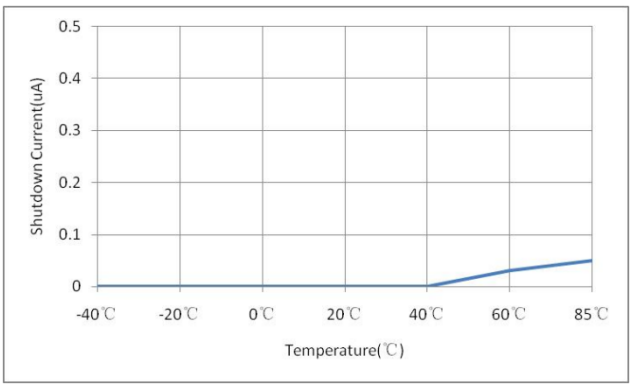
(V_{IN} = 4.3V; I_{OUT} = 1mA, C_{IN} = C_{OUT} = 1.0μF, unless otherwise noted. Typical values are at T_A = +25°C.)



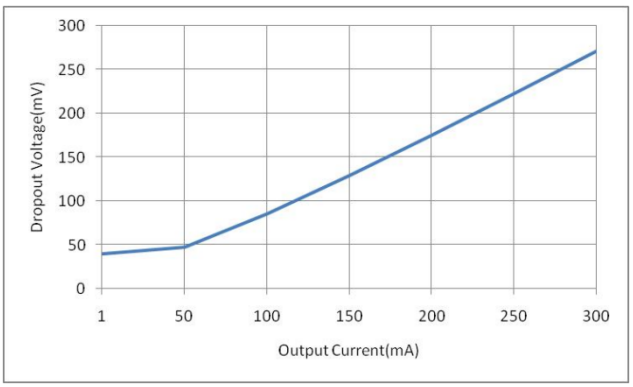
Output Voltage VS Temperature



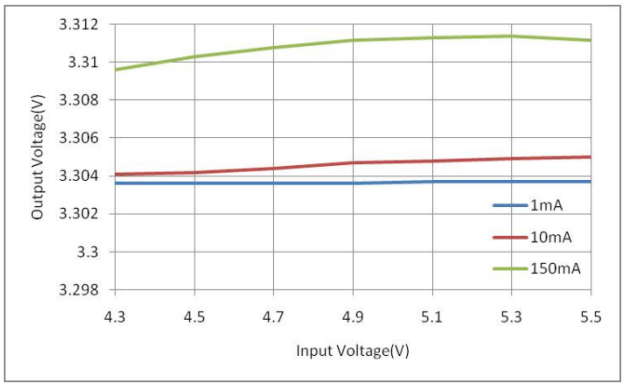
Supply Current VS Temperature



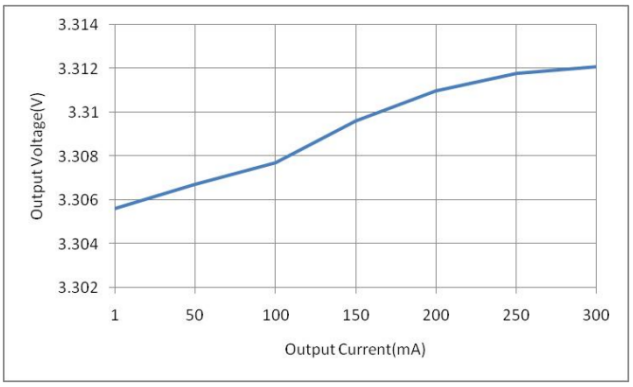
Shutdown Current VS Temperature



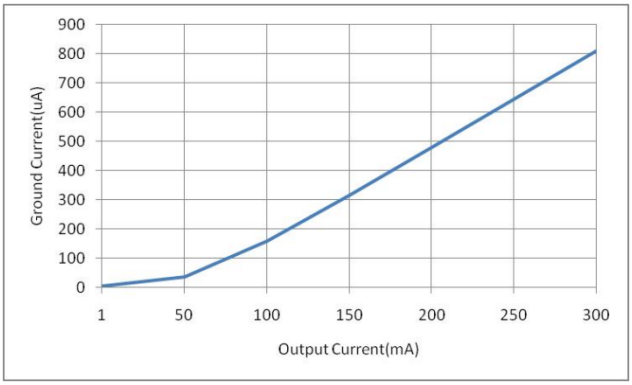
Dropout Voltage VS Output Current



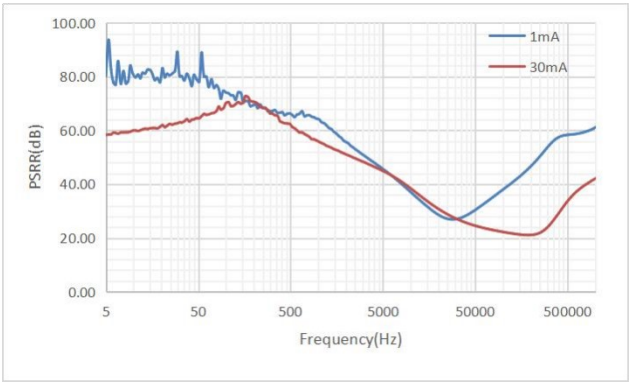
Output Voltage VS Input Voltage



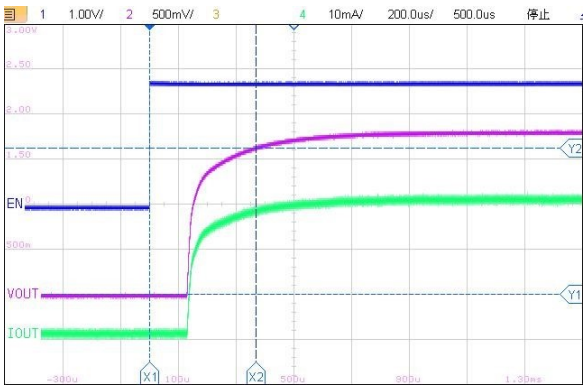
Output Voltage VS Output Current



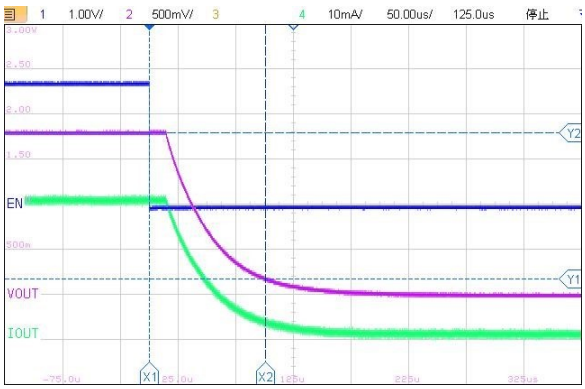
Ground Current VS Output Current



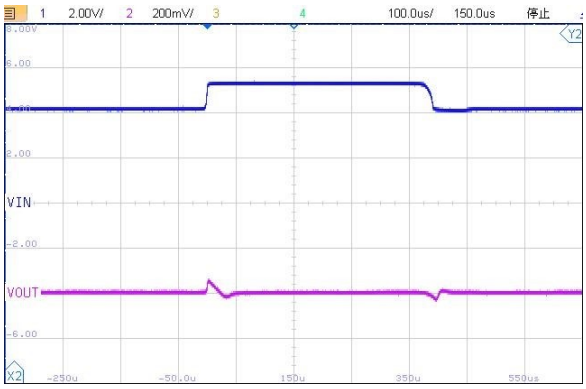
PSRR VS Output Current



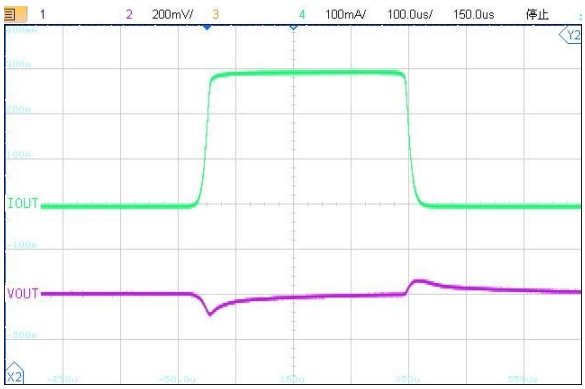
Turn On Speed VS EN Voltage (I_{OUT}=30mA)



Turn Off Speed VS EN Voltage (I_{OUT}=30mA)

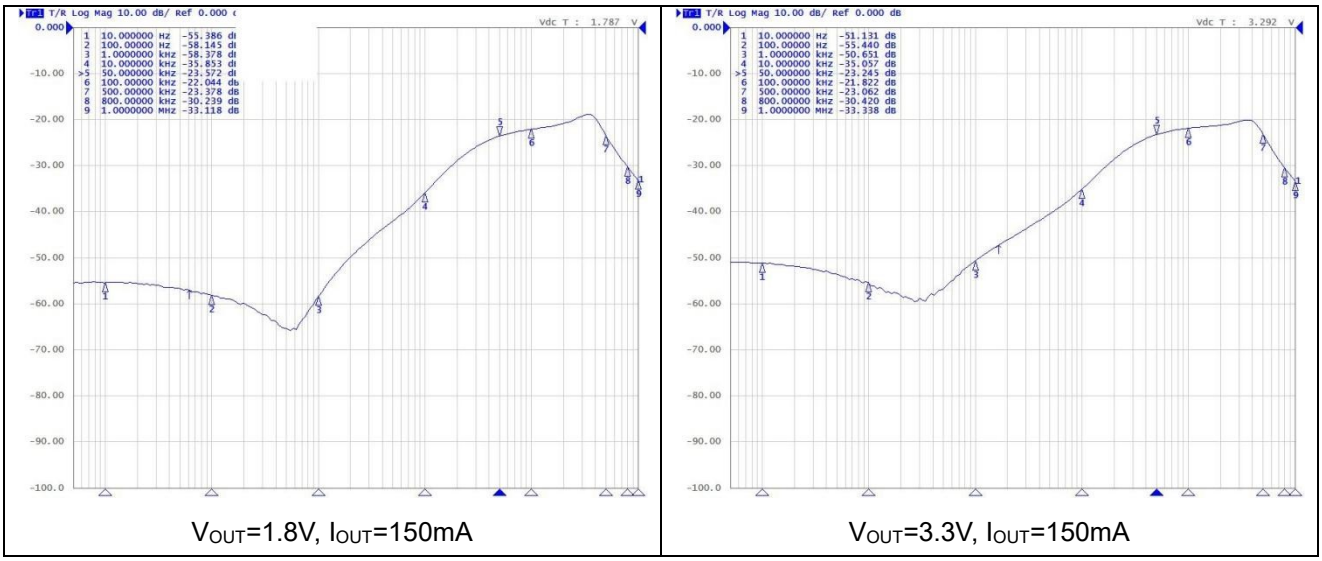


Line Transient Response(I_{OUT}=1mA)
V_{IN}=4.3V~5.5V, V_{OUT}=3.3V, I_{OUT}=1mA



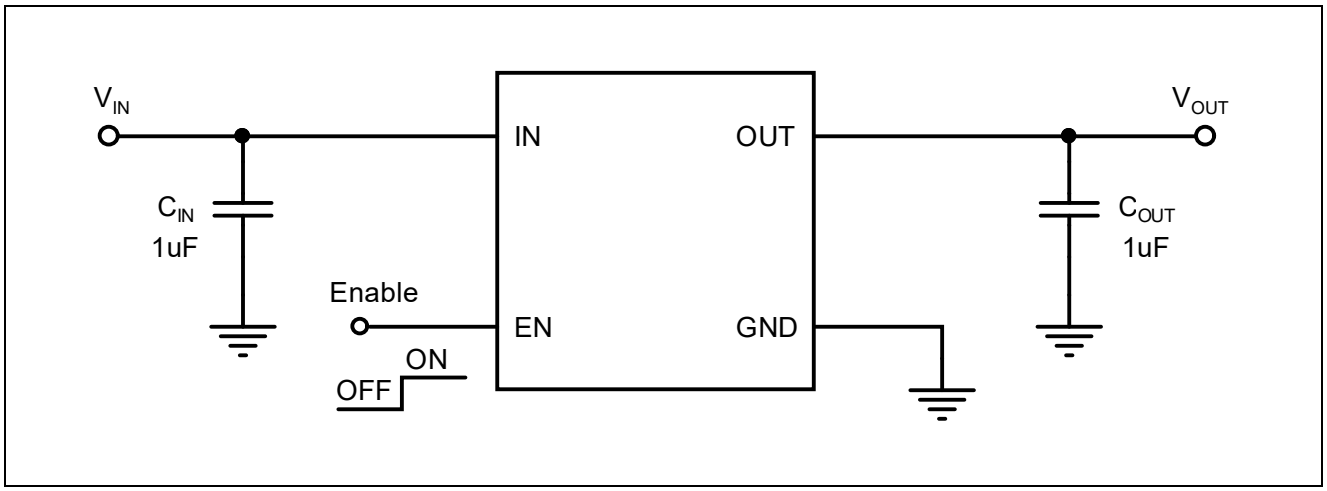
Load Transient Response V_{IN}=4.3V,
V_{OUT}=3.3V, I_{OUT}=1mA~300mA

PSRR



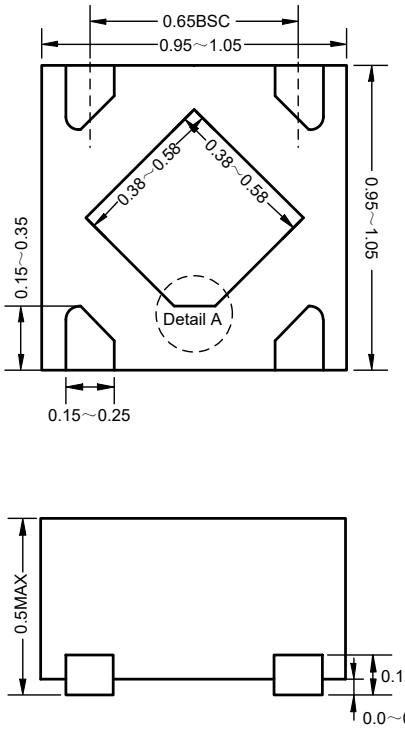
V_{OUT}=1.8V, I_{OUT}=150mA　　V_{OUT}=3.3V, I_{OUT}=150mA

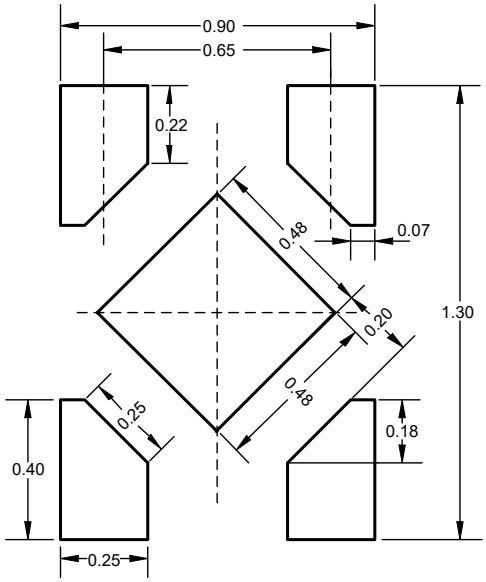
Applications Information



Package Dimension

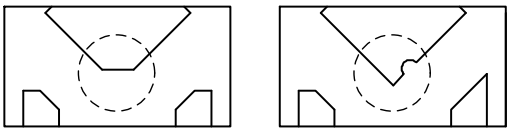
DFN4 (1×1)





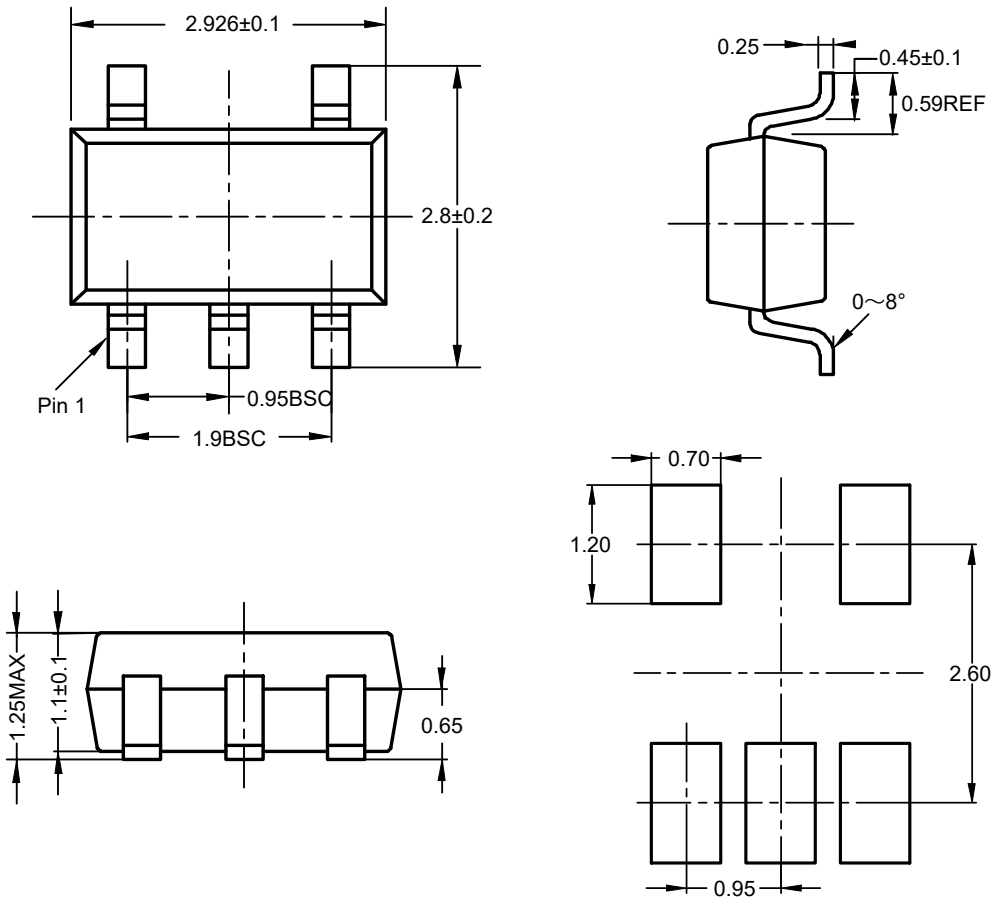
Recommended Land Pattern

Detail A: (PIN1 shape)



Unit: mm

SOT23-5



Recommended Land Pattern

Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2021-10-21	Preliminary Version	Liuxm	Liuxm	Liujy
1.1	2022-06-07	Initial Version	Shibo	Liuxm	Liujy
1.2	2023-11-23	Update Typeset Update package picture	Shibo	Liuxm	Liujy