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CMOS LDO Regulator Series for Portable Equipments

Versatile Package FULL CMOS LDO Regulator

BUxxUA3WNVX series

●General Description

BUxxUA3WNVX series is high-performance FULL CMOS regulator with 300-mA output, which is mounted on versatile package SSON004X1010 (1.00mm × 1.00 mm × 0.60mm). It has excellent noise characteristics and load responsiveness characteristics despite its low circuit current consumption of 50μA. It is most appropriate for various applications such as power supplies for logic IC, RF, and camera modules.

●Features

- High accuracy detection
- low current consumption
- Compatible with small ceramic capacitor (Cin=Co=1.0uF)
- With built-in output discharge circuit
- High ripple rejection
- ON/OFF control of output voltage
- With built-in over current protection circuit and thermal shutdown circuit
- Low dropout voltage

●Key Specifications

- Output voltage: 1.0V to 3.7V
- Accuracy output voltage: ±1.0% (±25mV)
- Low current consumption: 50μA
- Operating temperature range: -40°C to +85°C

●Applications

Battery-powered portable equipment, etc.

●Package

SSON004X1010 : 1.00mm x 1.00mm x 0.60mm

●Typical Application Circuit

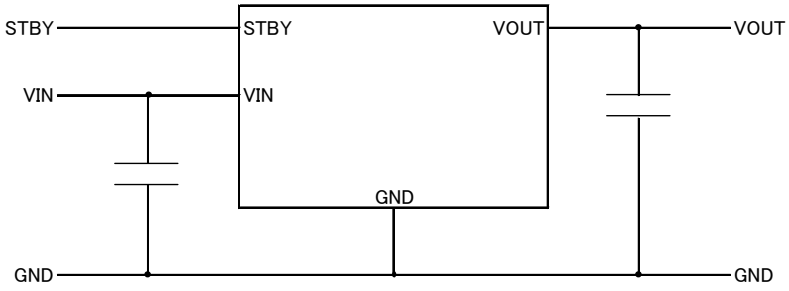
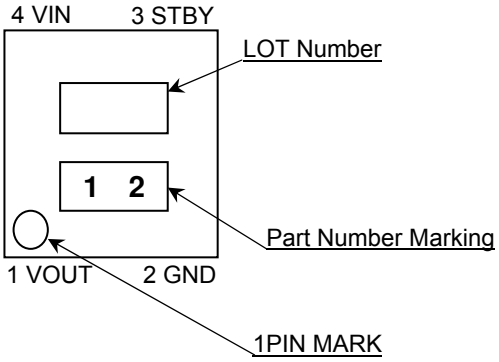


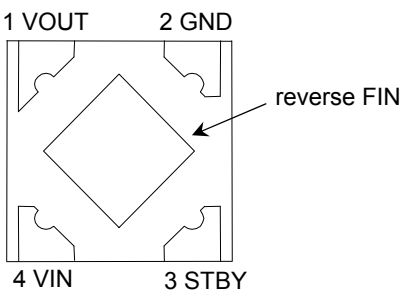
Figure 1. Application Circuit

●Connection Diagram

SSON004X1010 TOP VIEW



BOTTOM VIEW



●Pin Descriptions

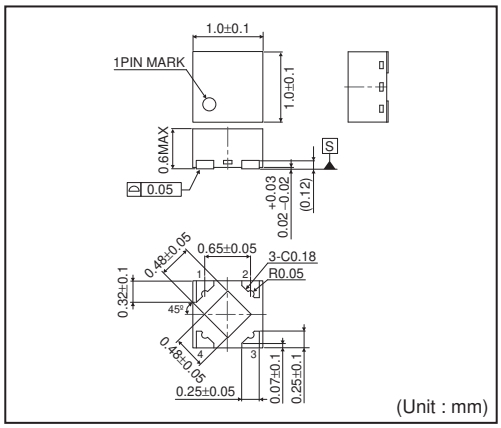
SSON004X1010		
PIN No.	Symbol	Function
1	VOUT	Output Voltage
2	GND	Grouding
3	STBY	ON/OFF control of output voltage (High: ON, Low: OFF)
4	VIN	Power Supply Voltage
reverse	FIN	Substrate (Connect to GND)

● Ordering Information

B U x x U A 3 W N V X - T L

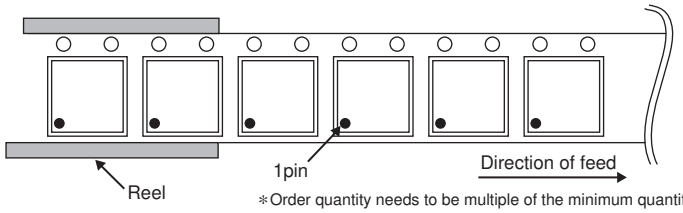
Part Number	Output Voltage 10 : 1.0V ⇩ 37 : 3.7V	Low Dropout Voltage Maximum Output Current 300mA	with output discharge	Package NVX : SSON004X1010	Packageing and forming specification Embossed tape and reel TL : The pin number 1 is the lower left

SSON004X1010



<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	5000pcs
Direction of feed	TL (The direction is the 1pin of product is at the lower left when you hold reel on the left hand and you pull out the tape on the left hand)



∗Order quantity needs to be multiple of the minimum quantity.

●**Lineup**

Marking	e	ml	nl	Ul	Yl	al	ql	Bi	f	g	bl
Output Voltage	1.0V	1.05V	1.1V	1.15V	1.2V	1.25V	1.3V	1.35V	1.5V	1.8V	1.85V
Part Number	BU10	BU1A	BU11	BU1B	BU12	BU1C	BU13	BU1D	BU15	BU18	BU1J

dl	el	fl	gl	rl	hl	h	m	ul	yl	n
1.9V	2.0V	2.05V	2.1V	2.2V	2.3V	2.5V	2.6V	2.7V	2.75V	2.8V
BU19	BU20	BU2A	BU21	BU22	BU23	BU25	BU26	BU27	BU2H	BU28

z	u	0i	k	1i	2i	y	3i	9
2.85V	2.9V	2.95V	3.0V	3.1V	3.2V	3.3V	3.4V	3.7V
BU2J	BU29	BU2K	BU30	BU31	BU32	BU33	BU34	BU37

●**Absolute Maximum Ratings (Ta=25°C)**

PARAMETER	Symbol	Limit	Unit
Power Supply Voltage	VMAX	-0.3 ～ +6.0	V
Power Dissipation	Pd	560(*1)	mW
Maximum junction temperature	TjMAX	+125	℃
Operating Temperature Range	Topr	-40 ～ +85	℃
Storage Temperature Range	Tstg	-55 ～ +125	℃

(∗1) Pd deleted at 5.6mW/℃ at temperatures above Ta=25℃, mounted on 70×70×1.6 mm glass-epoxy PCB.

● **RECOMMENDED OPERATING RANGE (not to exceed Pd)**

PARAMETER	Symbol	Limit	Unit
Power Supply Voltage	VIN	1.7～5.5	V
Maximum Output Current	IMAX	300	mA

●**OPERATING CONDITIONS**

PARAMETER	Symbol	MIN.	TYP.	MAX.	Unit	CONDITION
Input Capacitor	Cin	0.47(*2)	1.0	-	μF	Ceramic capacitor recommended
Output Capacitor	Co	0.47(*2)	1.0	-	μF	

(*2) Make sure that the output capacitor value is not kept lower than this specified level across a variety of temperature, DC bias, characteristic.

●Electrical Characteristics

(Ta=25℃, VIN=VOUT+1.0V (*3), STBY=VIN, Cin=1.0μF, Co=1.0μF, unless otherwise noted.)

PARAMETER		Symbol	Limit			Unit	Conditions
			MIN.	TYP.	MAX.		
Overall Device							
Output Voltage		VOUT	VOUT×0.99	VOUT	VOUT×1.01	V	IOUT=10μA, VOUT≧2.5V
			VOUT-25mV		VOUT+25mV		IOUT=10μA, VOUT＜2.5V
Operating Current		IIN	-	50	90	μA	IOUT=0mA
Operating Current (STBY)		ISTBY	-	-	1.0	μA	STBY=0V
Ripple Rejection Ratio		RR	45	70	-	dB	VRR=-20dBv,fRR=1kHz,IOUT=150mA, VIN=3.6V
Dropout Voltage		VSAT	-	470	700	mV	1.0V≦VOUT＜1.2V(IOUT=300mA)
			-	350	500	mV	1.2V≦VOUT＜1.5V(IOUT=300mA)
			-	280	380	mV	1.5V≦VOUT＜1.7V(IOUT=300mA)
			-	250	320	mV	1.7V≦VOUT＜2.1V(IOUT=300mA)
			-	220	260	mV	2.1V≦VOUT＜2.5V(IOUT=300mA)
			-	200	220	mV	2.5V≦VOUT(IOUT=300mA)
Line Regulation		VDL	-	2	20	mV	VIN=VOUT+1.0V to 5.5V(*4), IOUT=10μA
Load Regulation		VDLO	-	25	45	mV	IOUT=0.01mA to 300mA
Over-current Protection (OCP)							
Limit Current		ILMAX	370	550	-	mA	Vo=VOUT*0.95
Short Current		ISHORT	50	150	300	mA	Vo=0V
Standby Block							
Discharge Resistor		RDSC	20	50	80	Ω	VIN=5.5V, STBY=0V, VOUT=2.6V
STBY Pin Pull-down Current		ISTB	0.1	0.9	8.0	μA	STBY=1.5V
STBY Control Voltage	ON	VSTBH	1.2	-	5.5	V	
	OFF	VSTBL	-0.3	-	0.3	V	

○This product is not designed for protection against radioactive rays.

(*3) VIN=2.5V for VOUT≦1.5V

(*4) VIN=2.5V to 5.5V for VOUT≦1.5V

●Block Diagrams

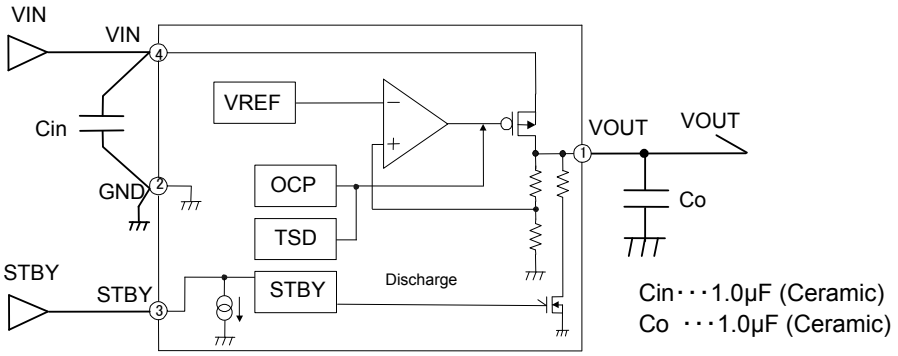
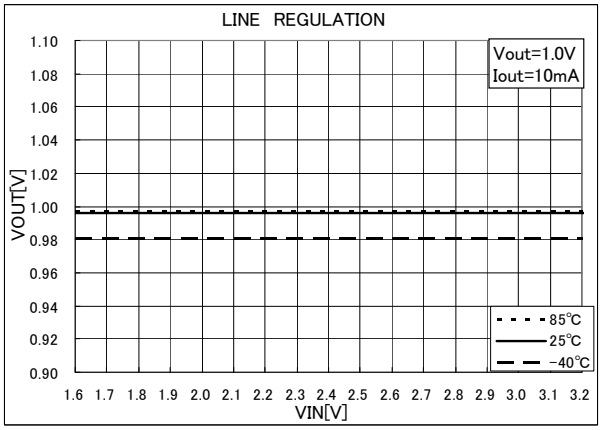


Figure 2. Block Diagrams

● **Reference data** **BU10UA3WNVX** (Ta=25ºC unless otherwise specified.)



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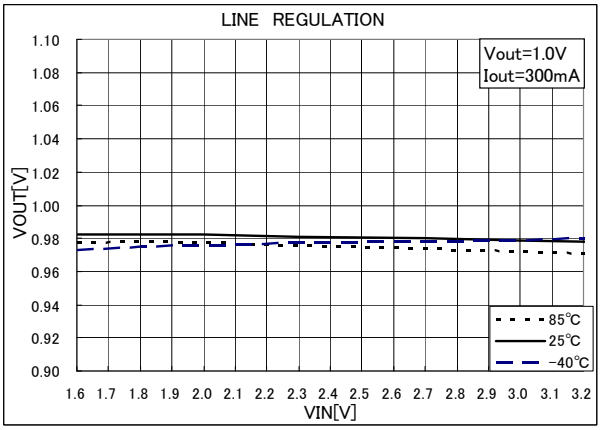

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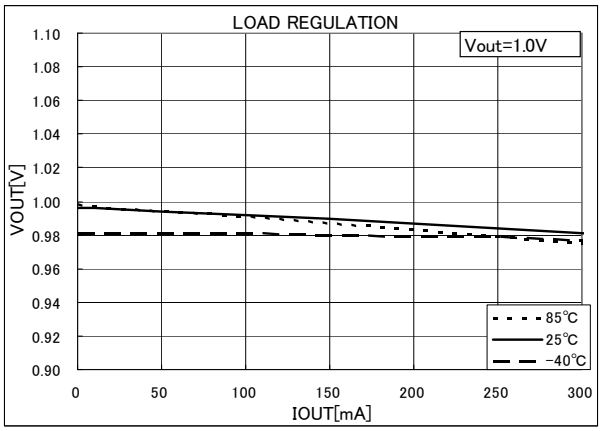

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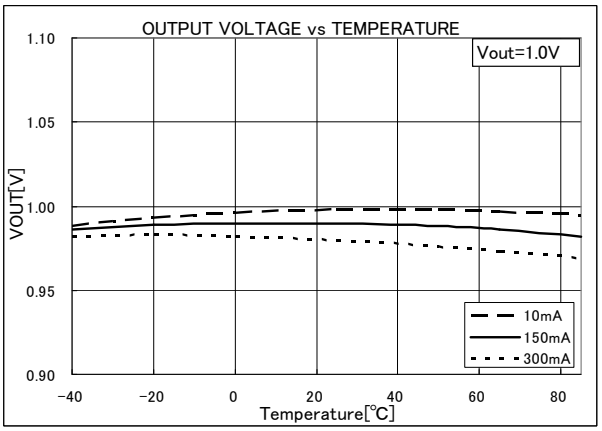

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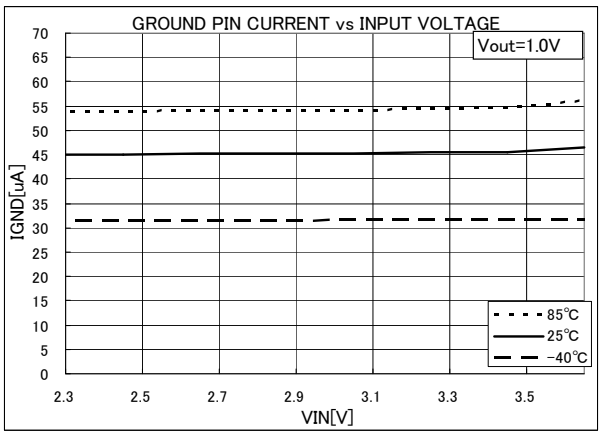

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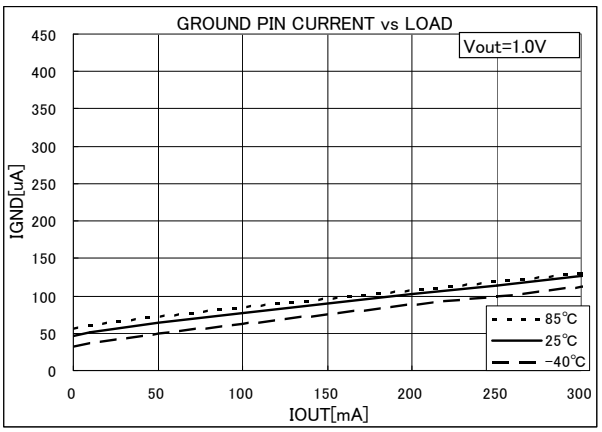

Figure 8.

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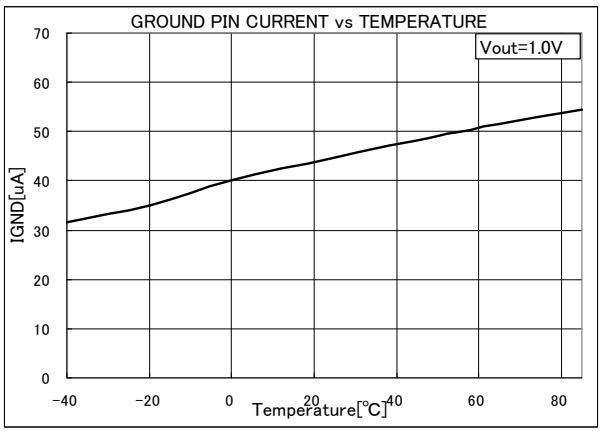

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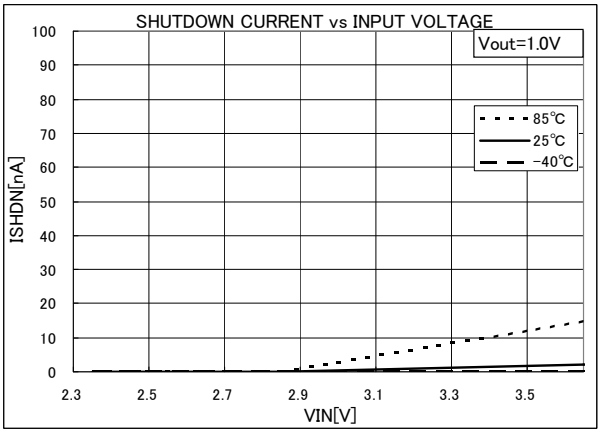

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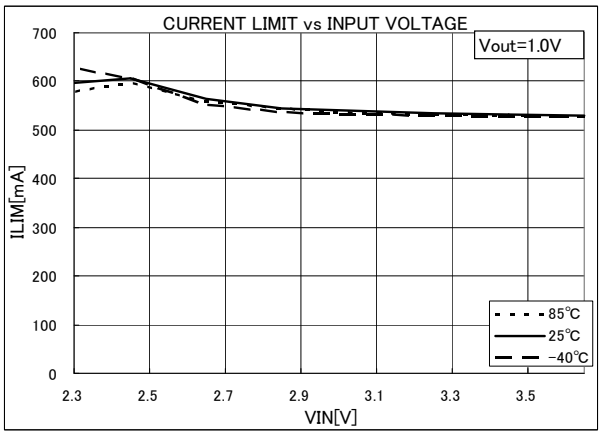

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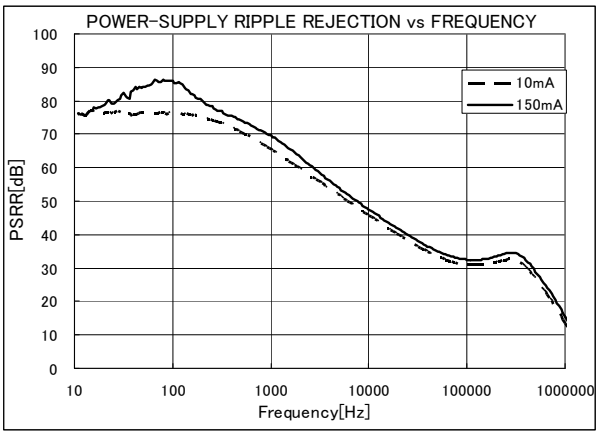

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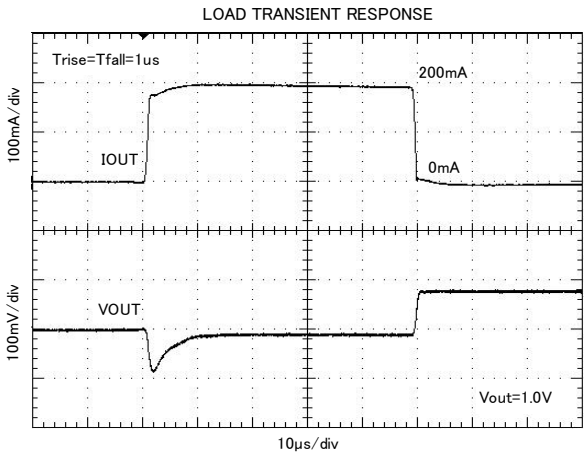

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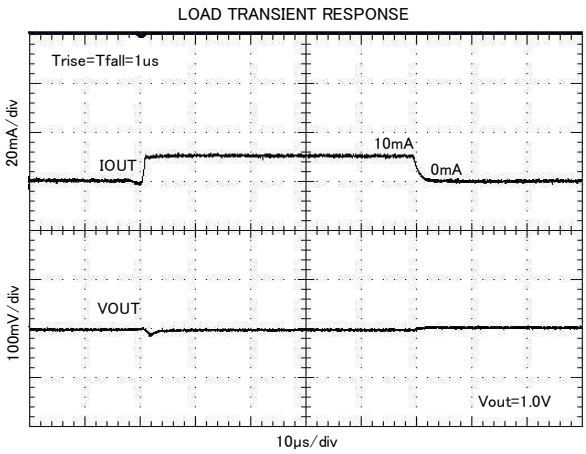

Figure 14.

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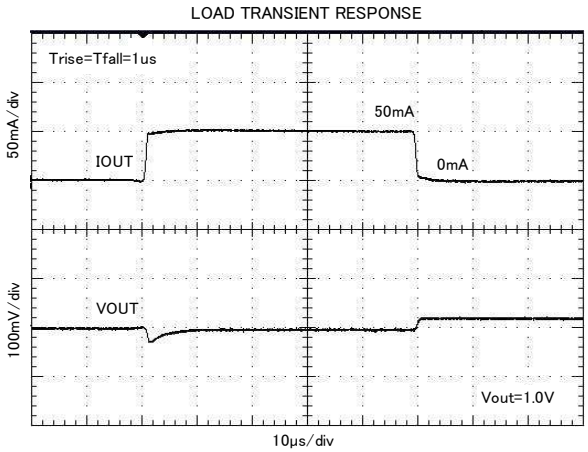

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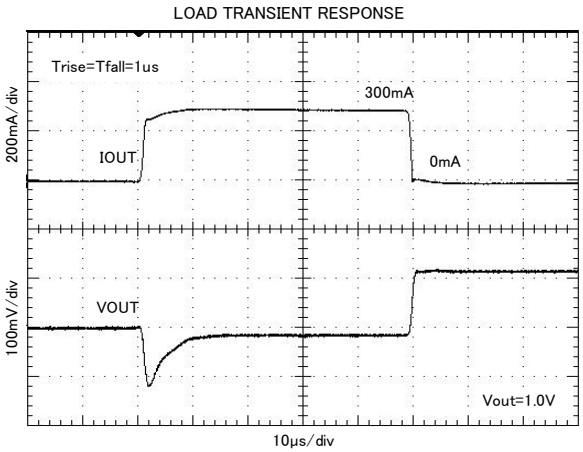

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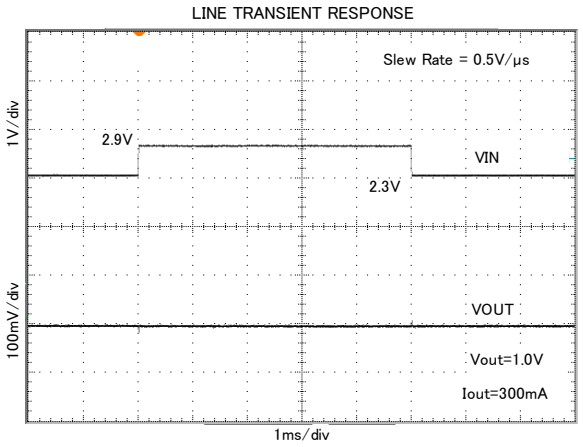

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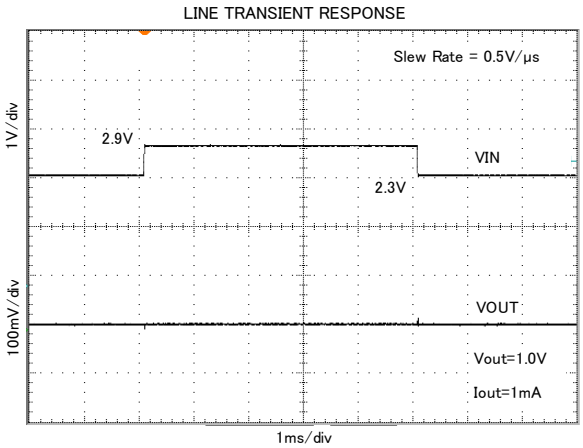

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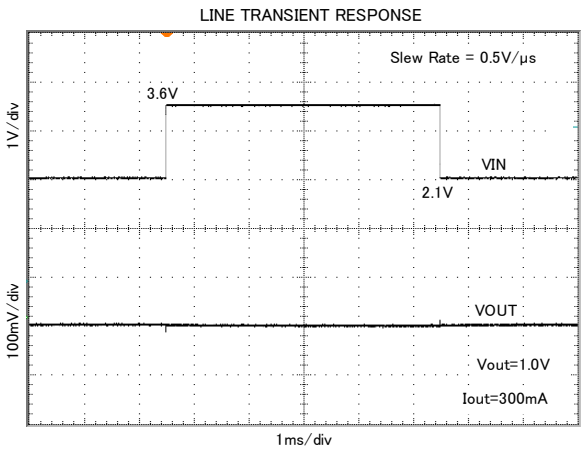

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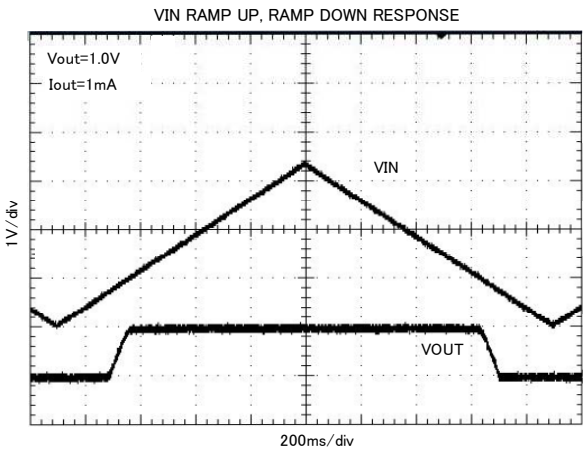

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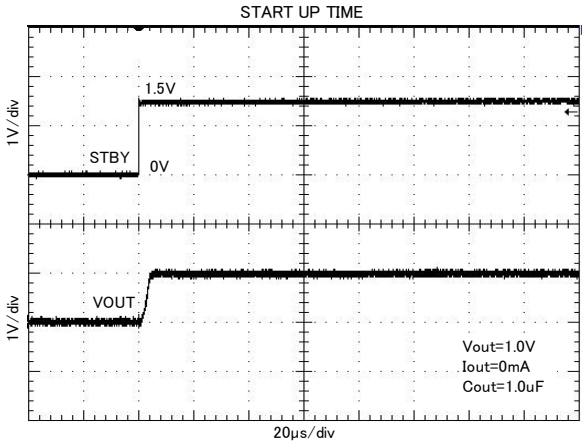

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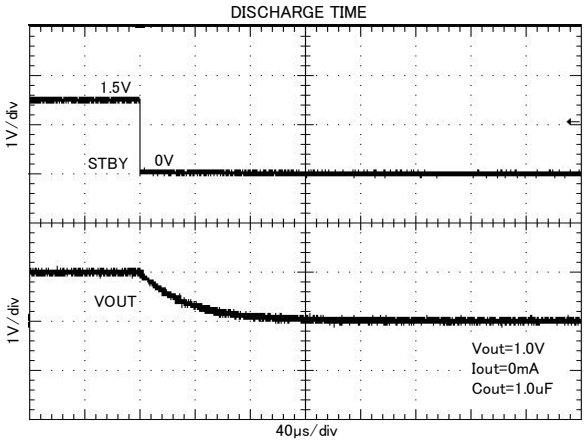

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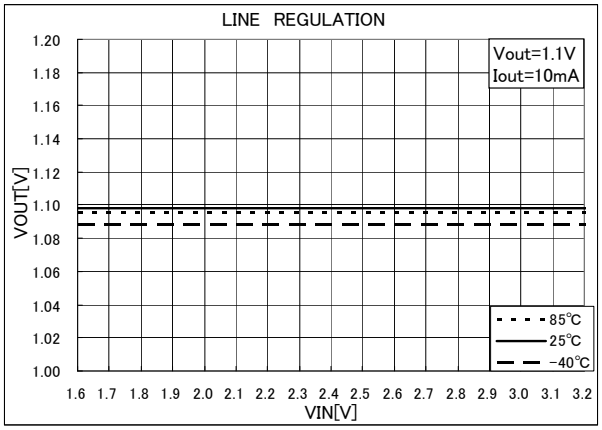

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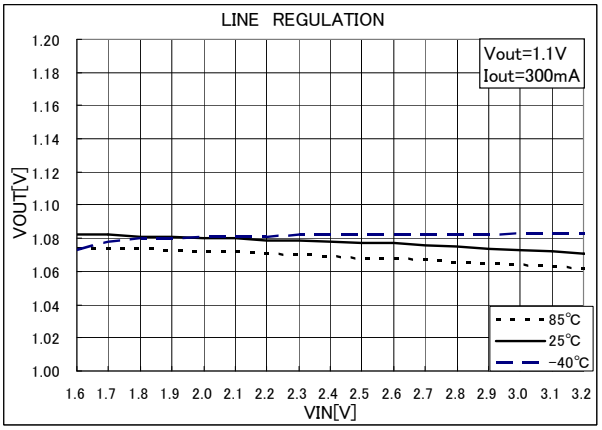

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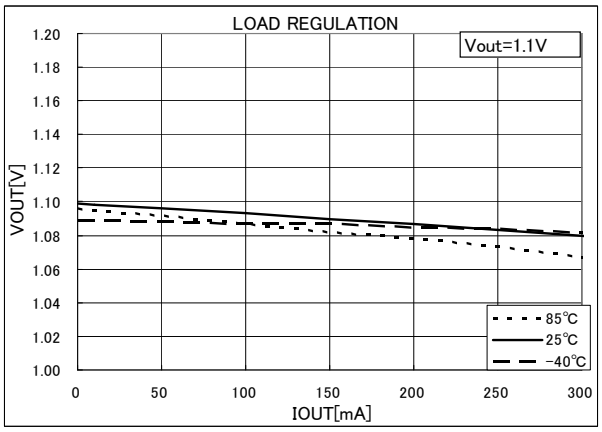

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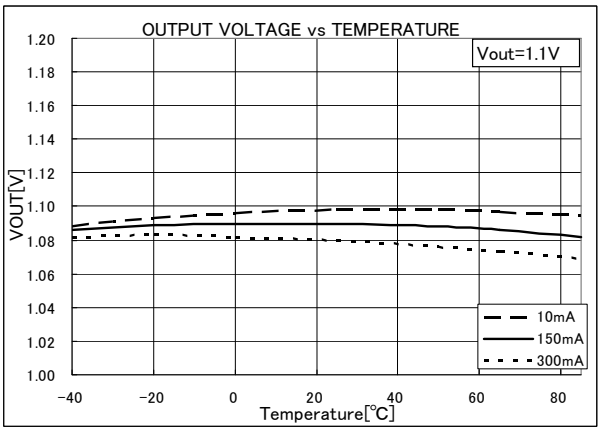

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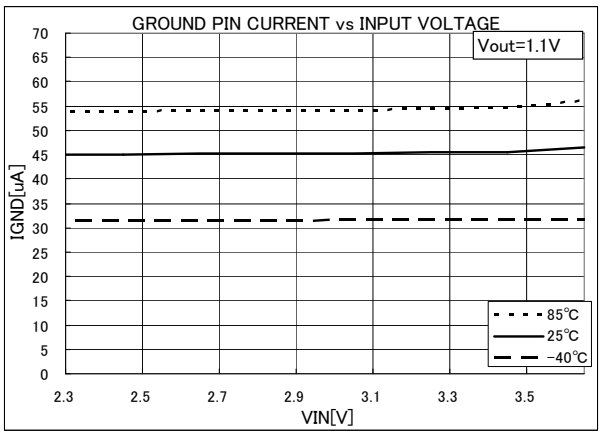

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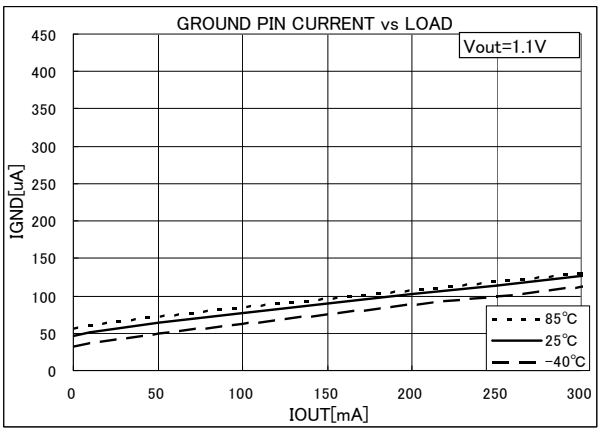

Figure 28.

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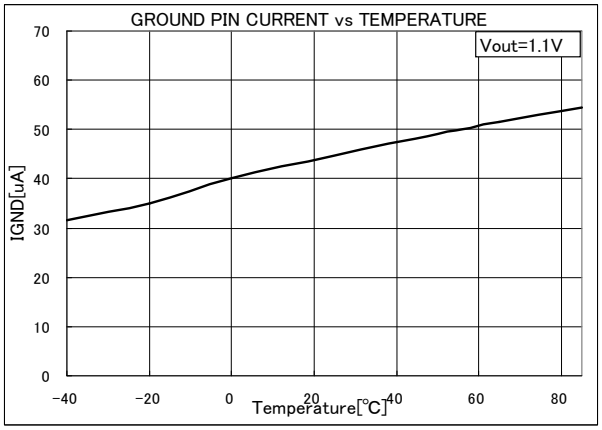

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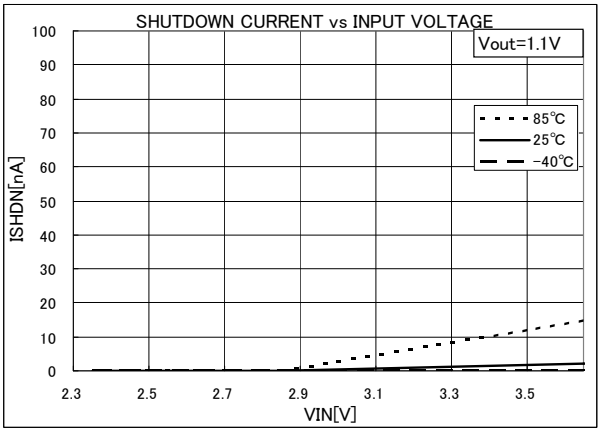

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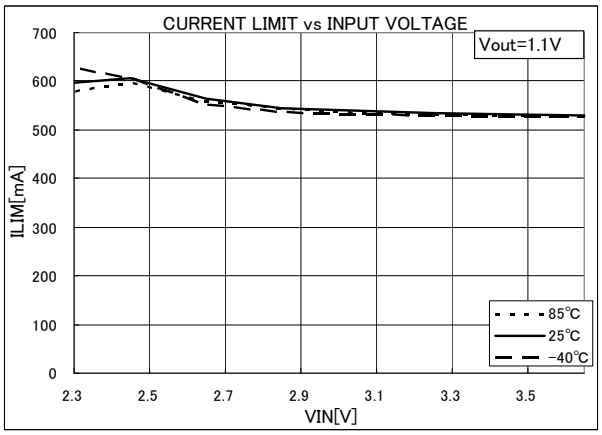

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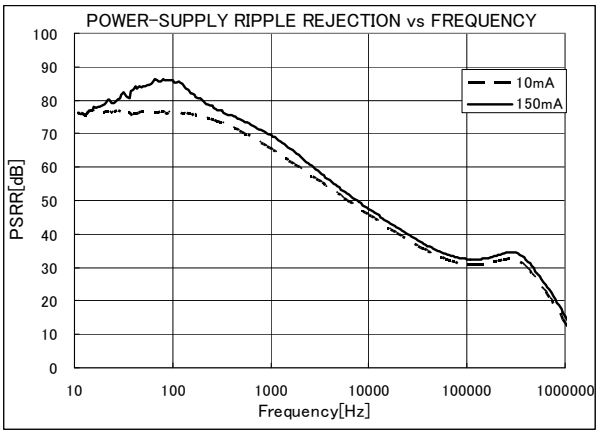

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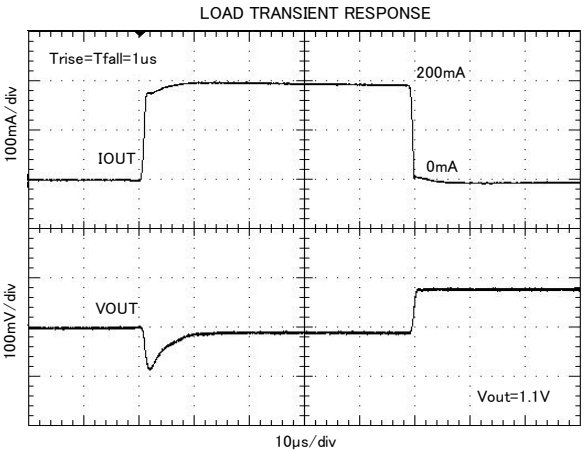

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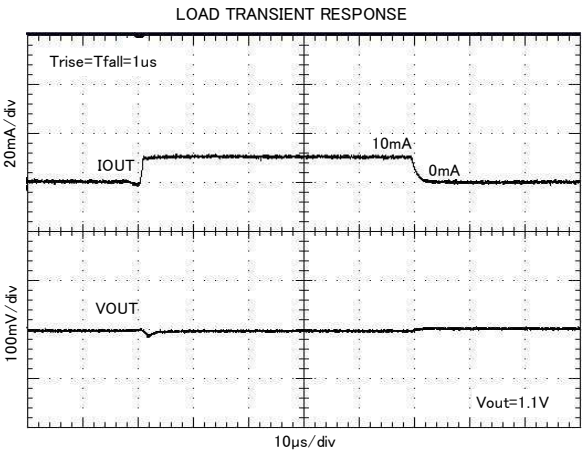
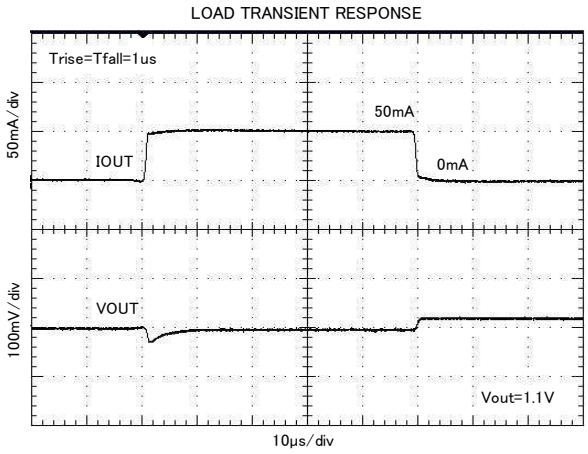


Figure 34.

● **Reference data** **BU11UA3WNVX** (Ta=25ºC unless otherwise specified.)



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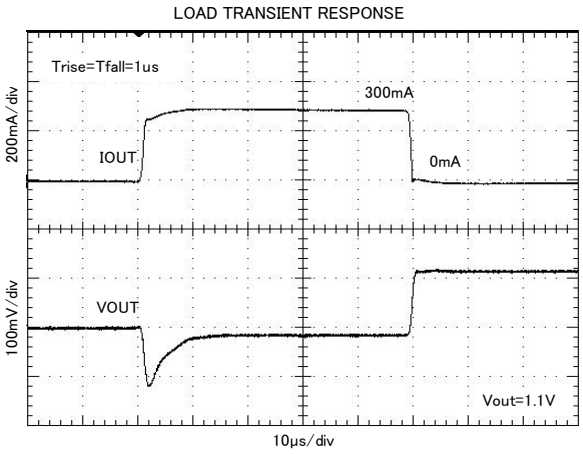

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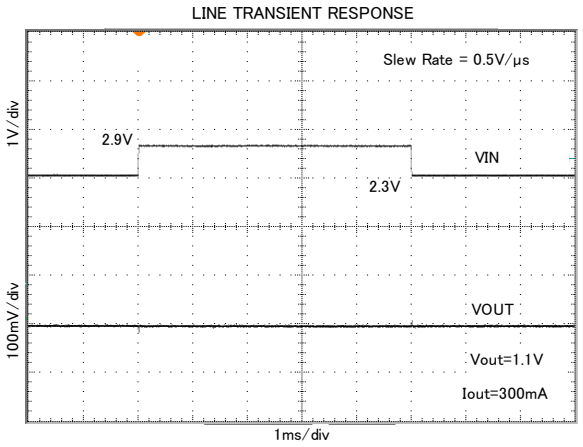
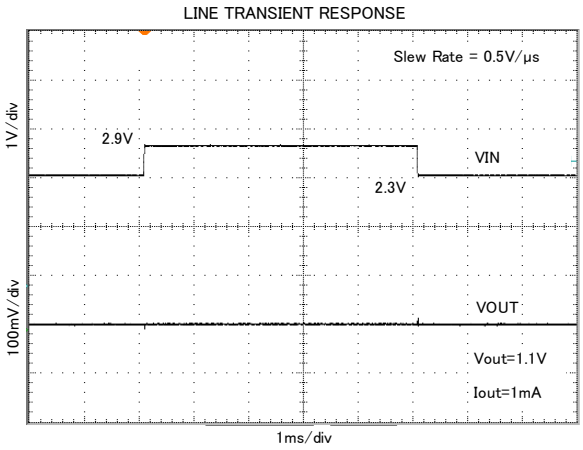


Figure 37.



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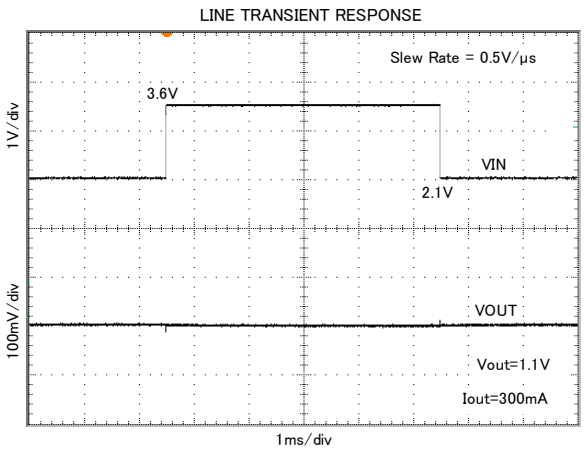

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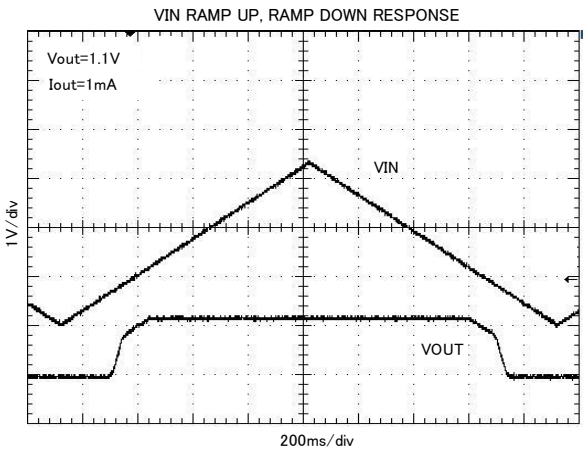
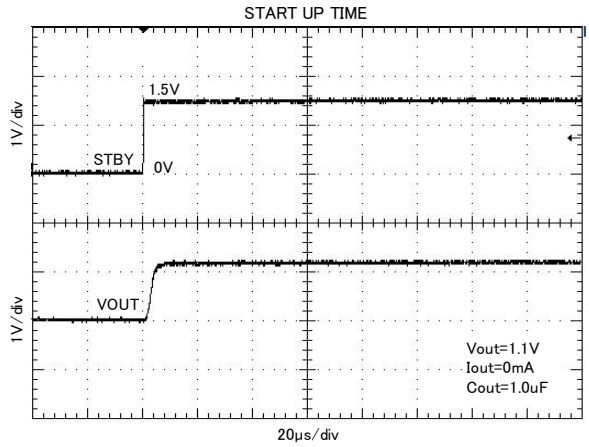


Figure 40.

● **Reference data** **BU11UA3WNVX** (Ta=25ºC unless otherwise specified.)



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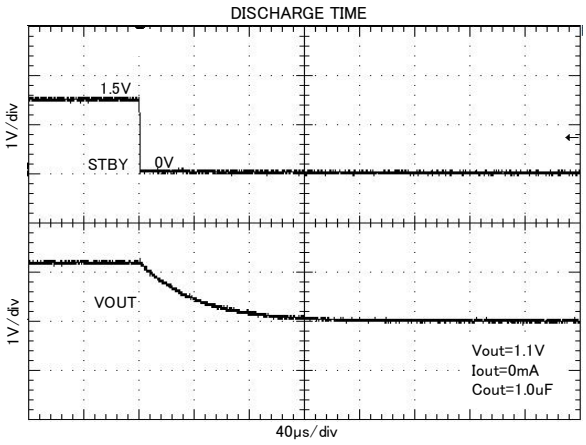
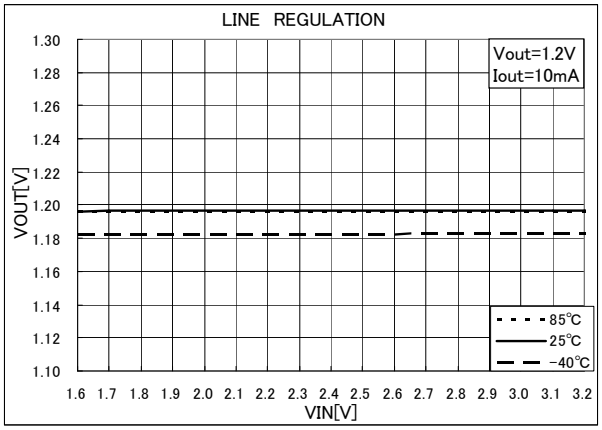


Figure 42.

● **Reference data** **BU12UA3WNVX** (Ta=25ºC unless otherwise specified.)



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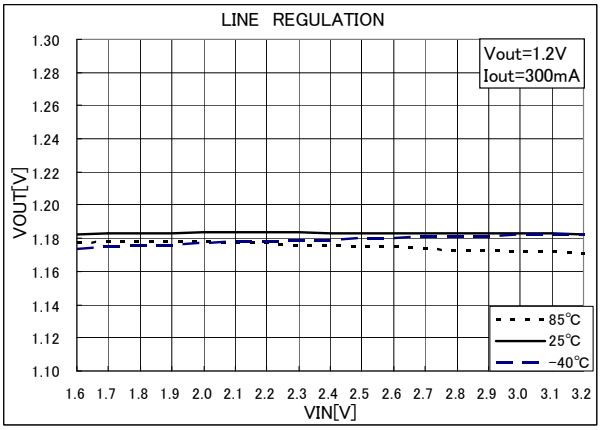

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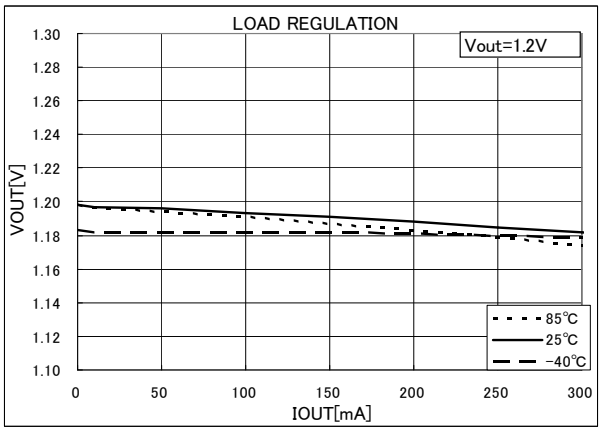

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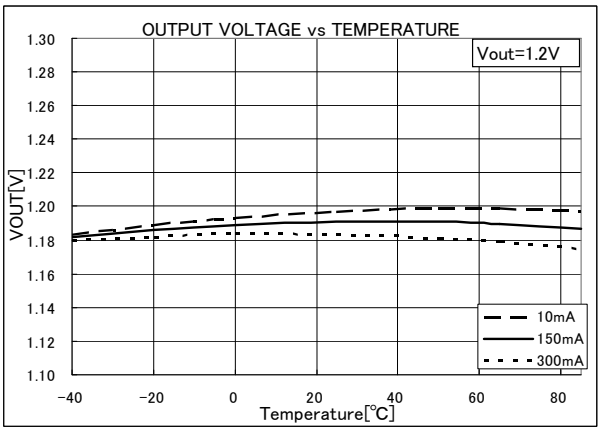

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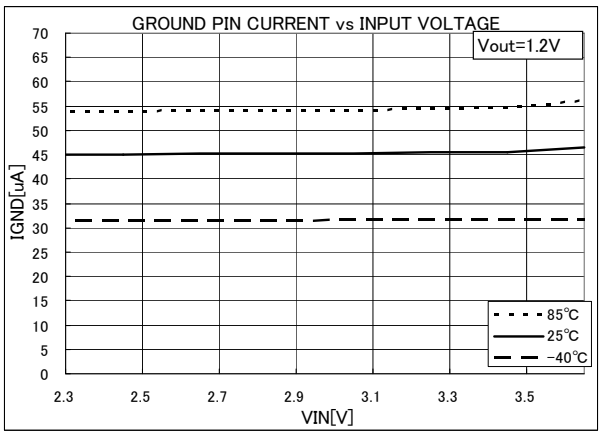


Figure 47.

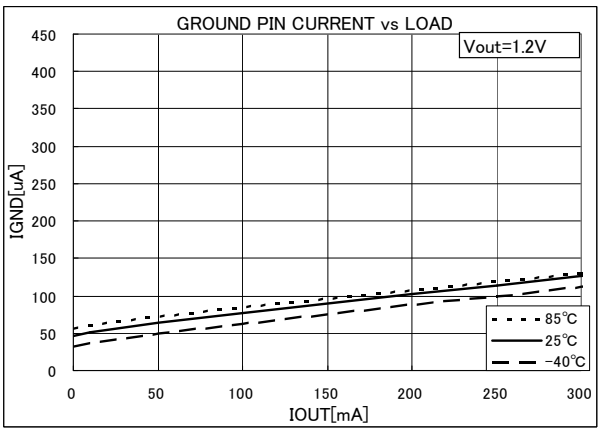
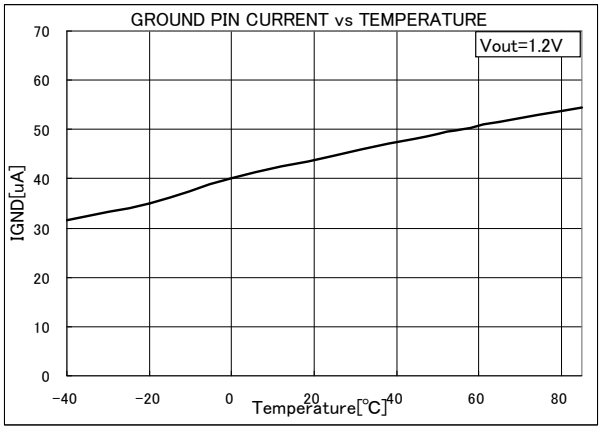


Figure 48.

● **Reference data** **BU12UA3WNVX** (Ta=25ºC unless otherwise specified.)



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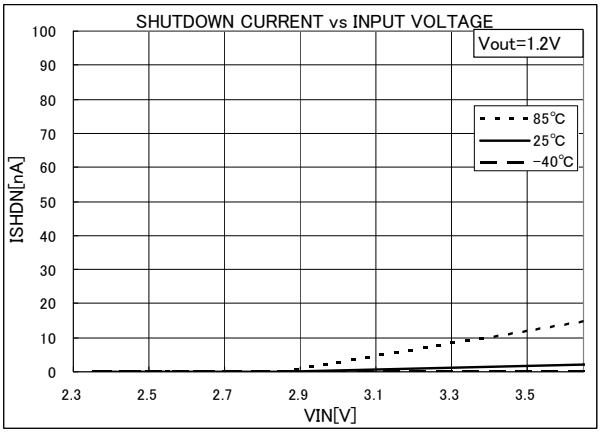

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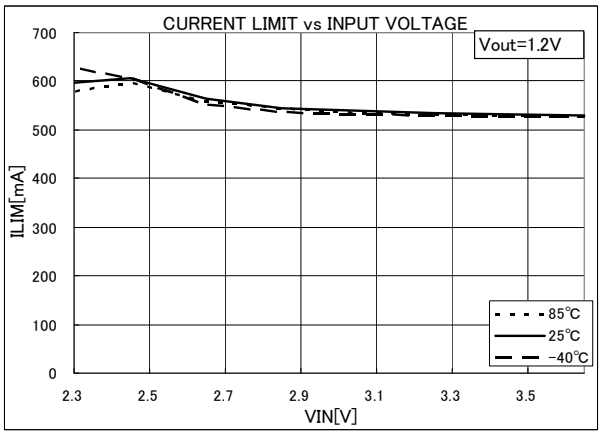

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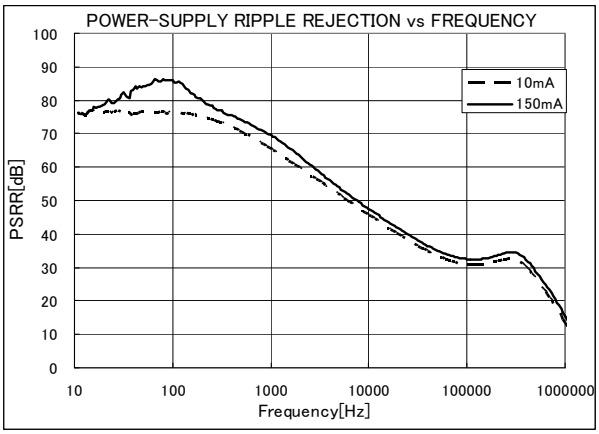

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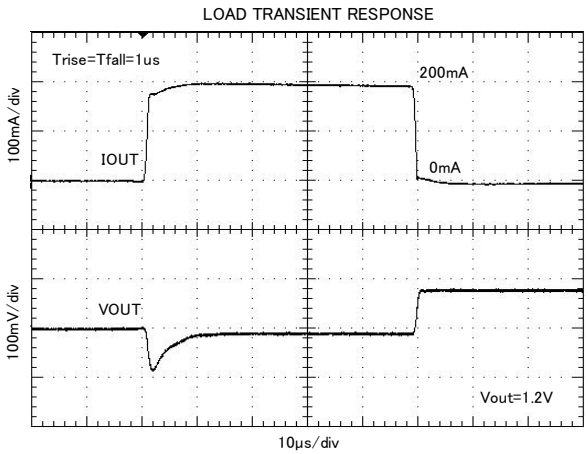

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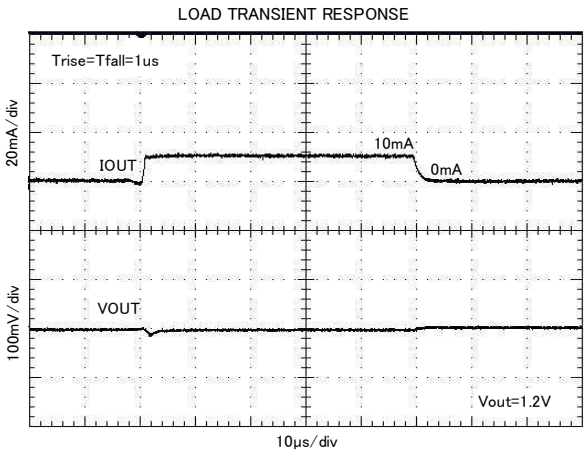


Figure 54.

● **Reference data** **BU12UA3WNVX** (Ta=25ºC unless otherwise specified.)

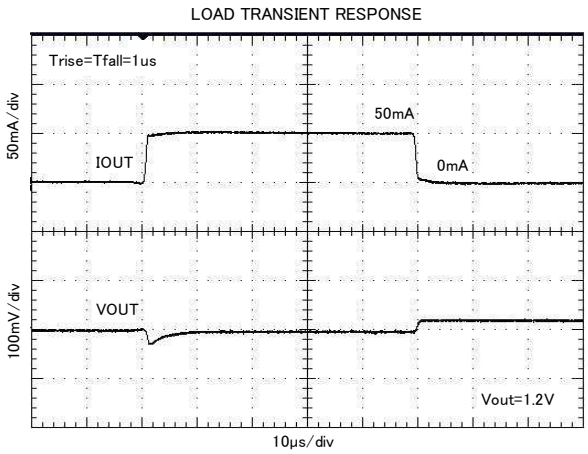
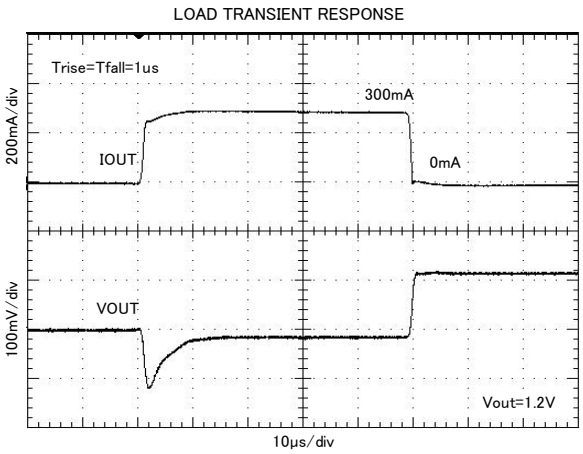


Figure 55.



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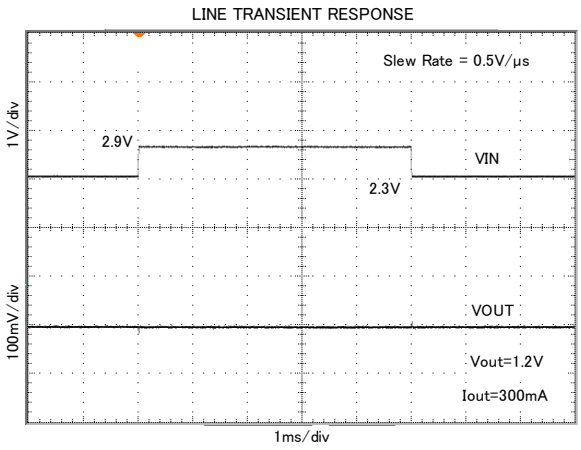

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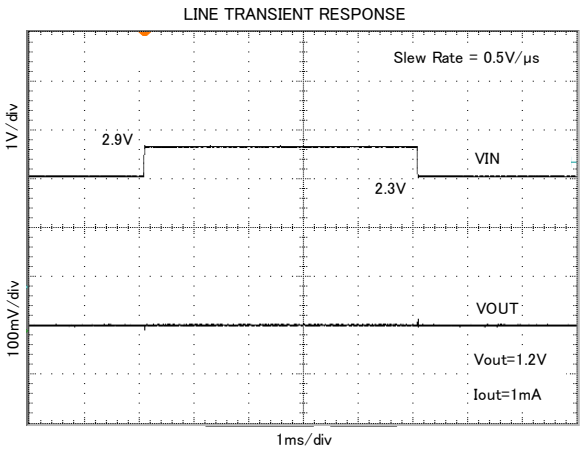
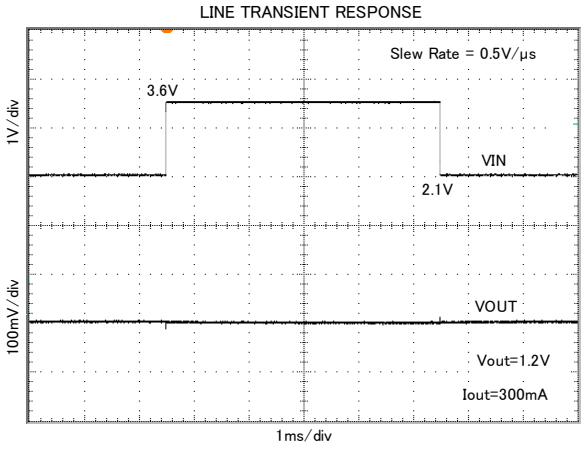


Figure 58.



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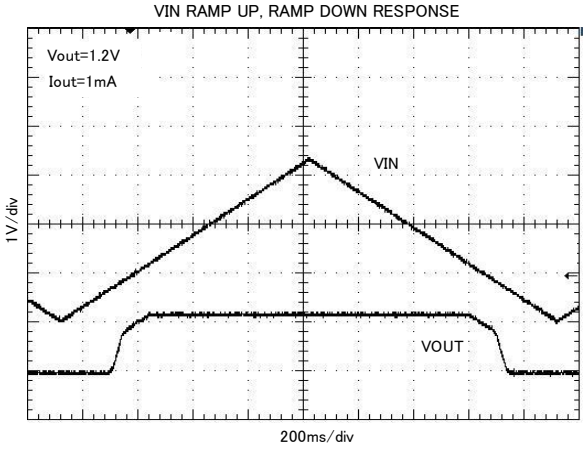

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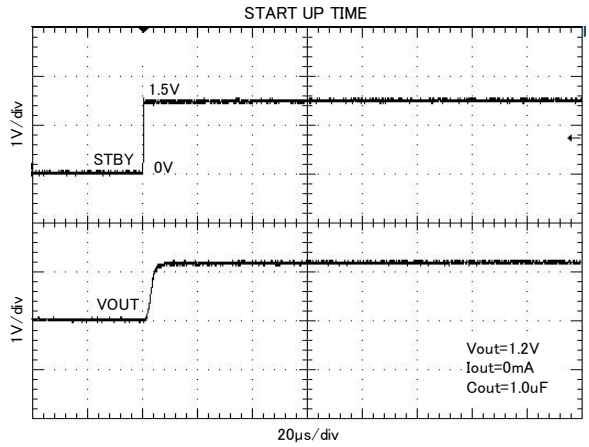

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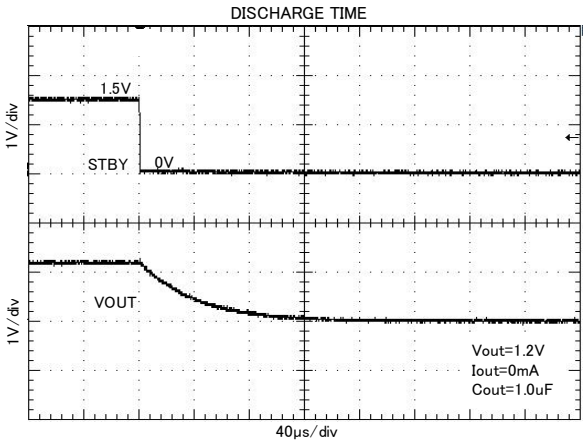


Figure 62.

● **Reference data** **BU18UA3WNVX** (Ta=25ºC unless otherwise specified.)

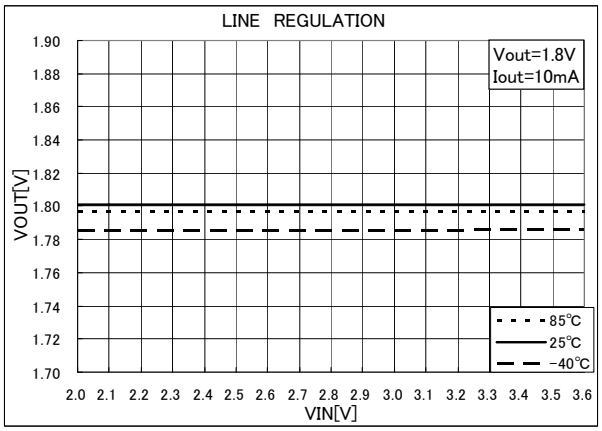


Figure 63.

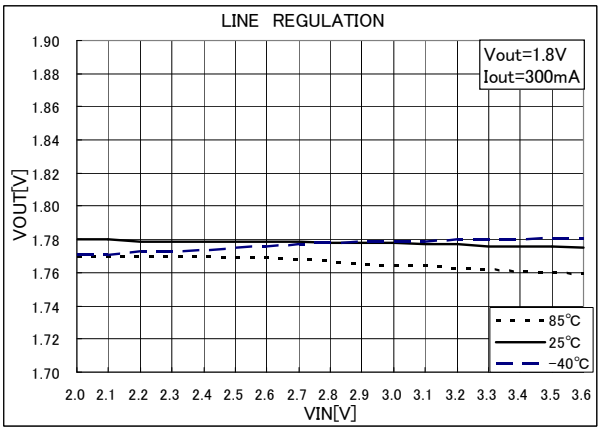
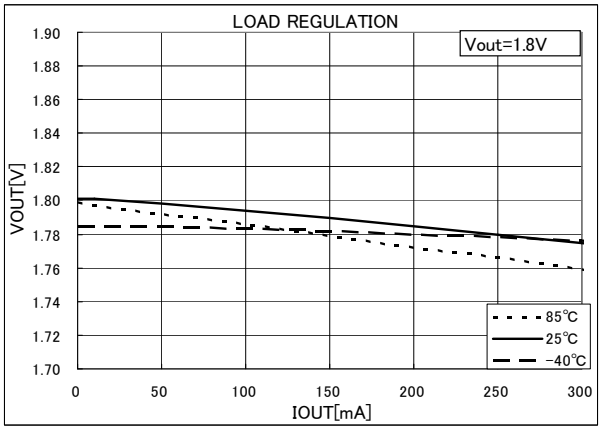


Figure 64.



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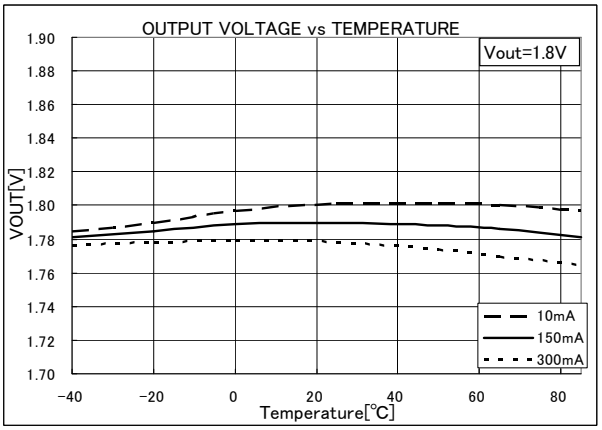

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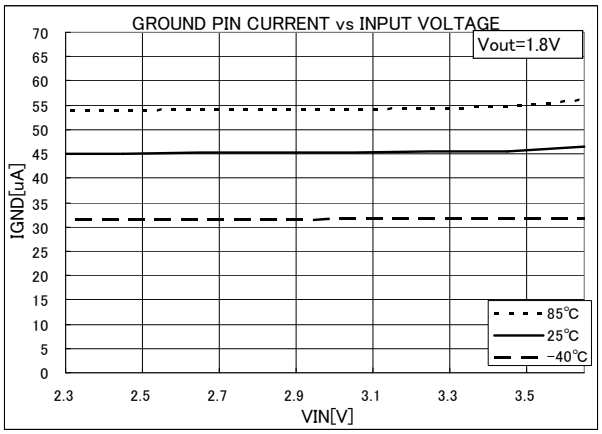

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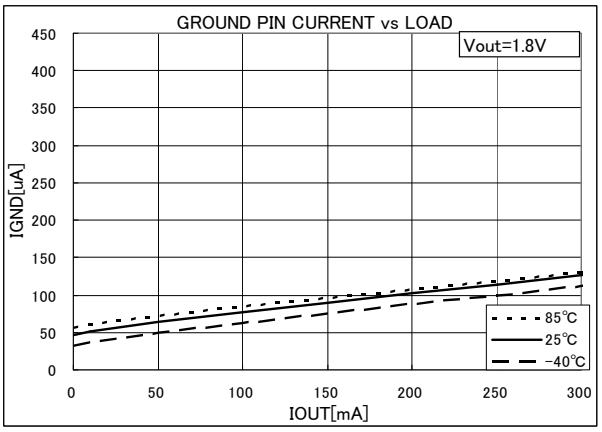
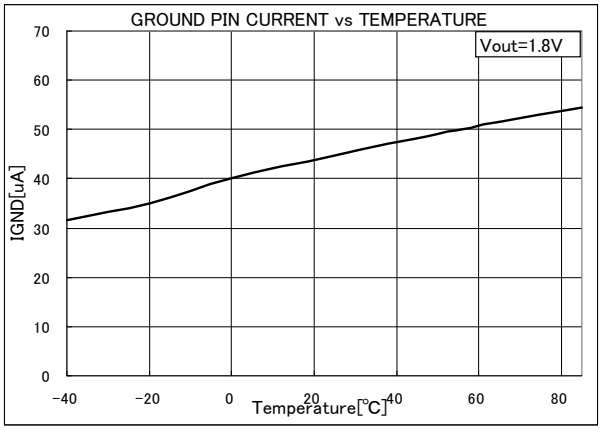


Figure 68.

● **Reference data** **BU18UA3WNVX** (Ta=25ºC unless otherwise specified.)



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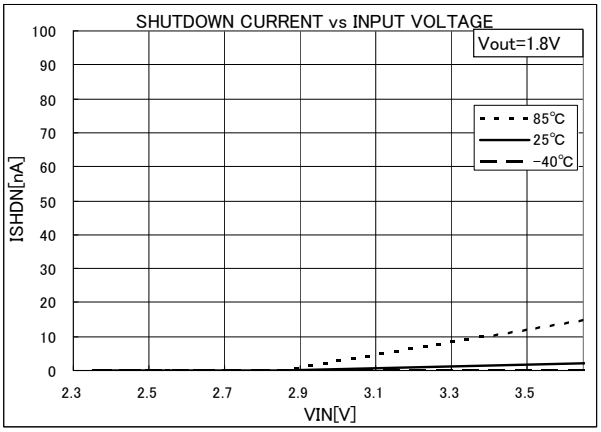

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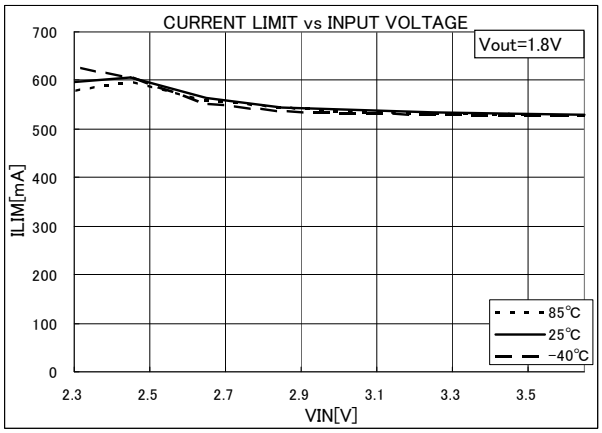

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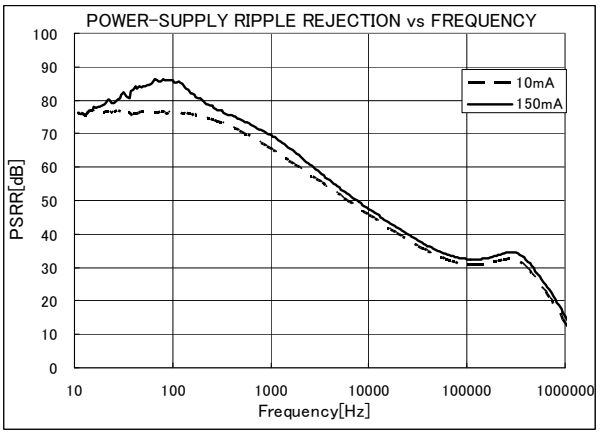

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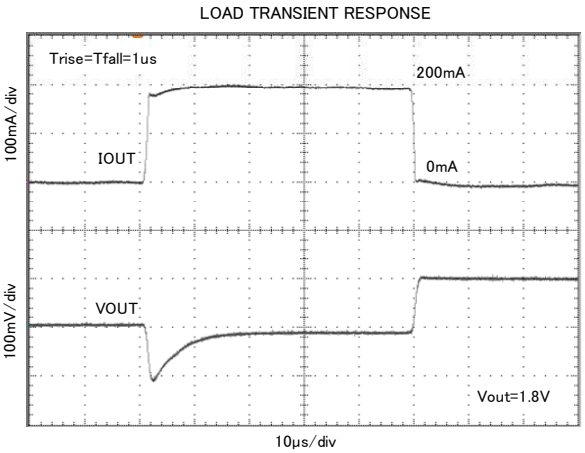

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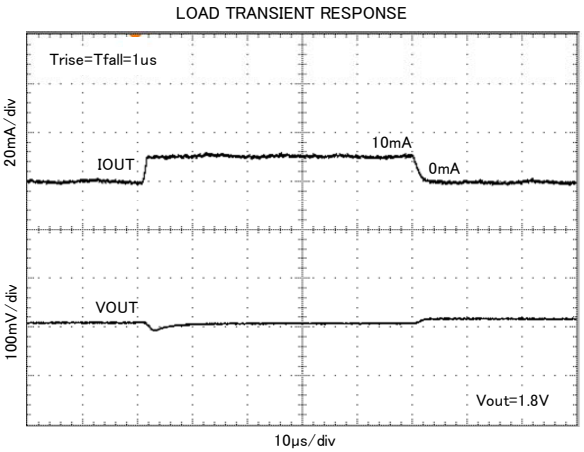

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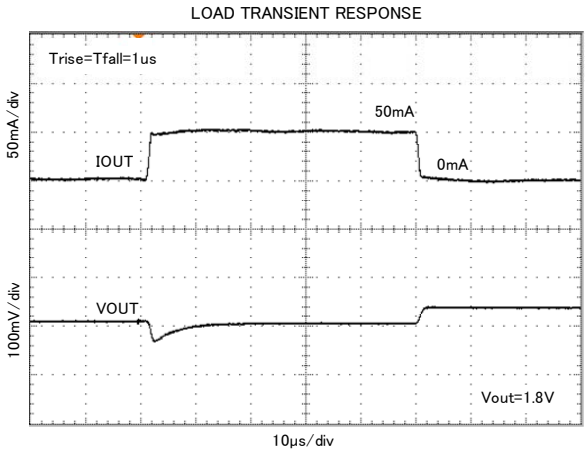

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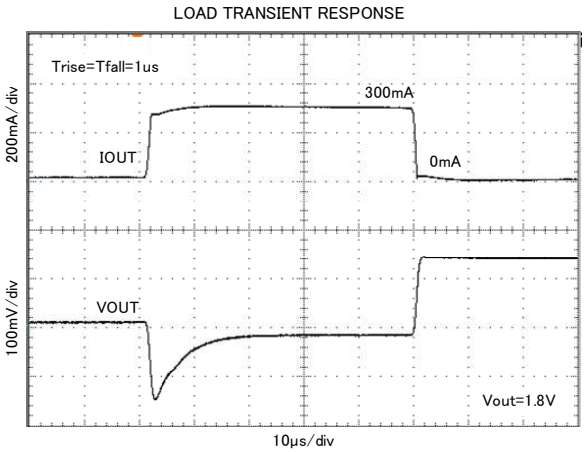

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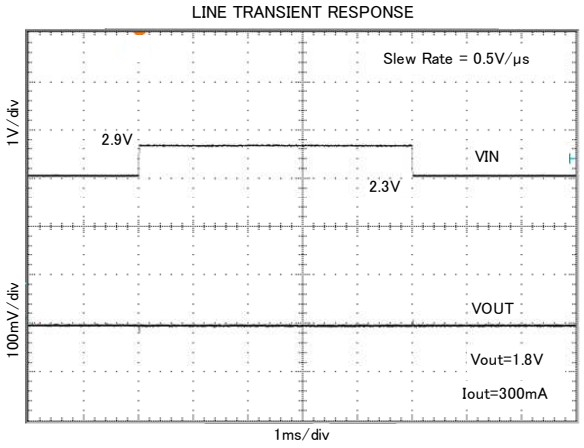

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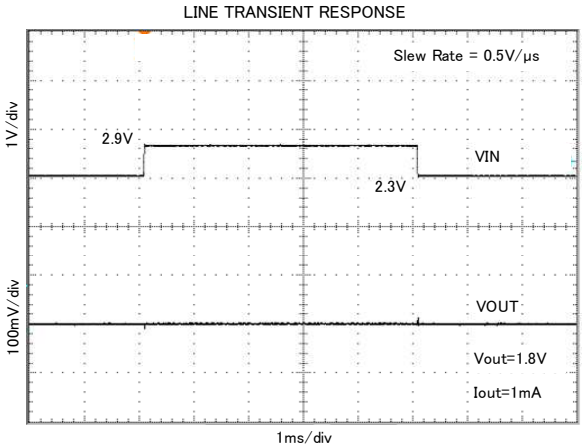

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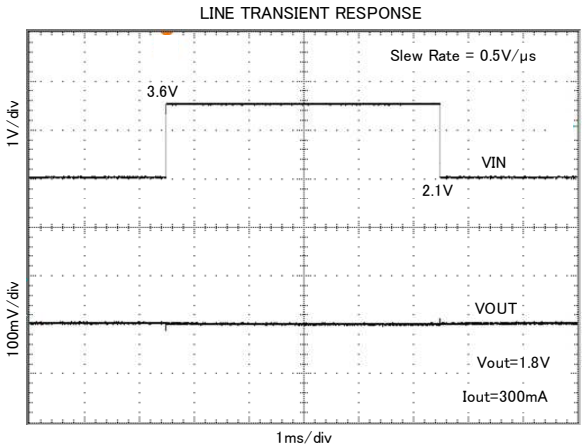

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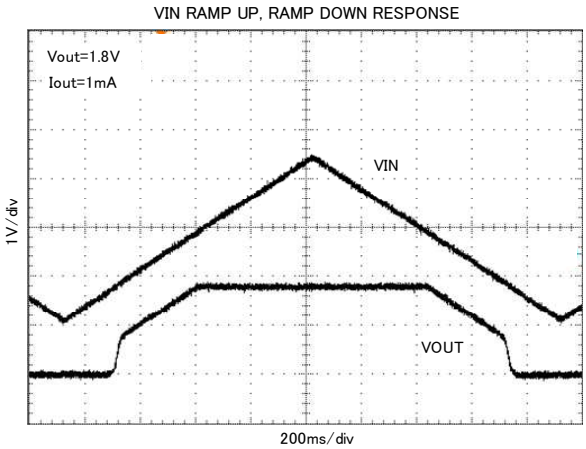
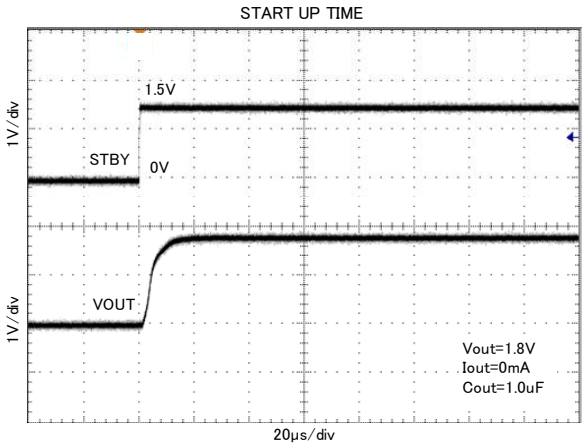


Figure 80.

● **Reference data** **BU18UA3WNVX** (Ta=25ºC unless otherwise specified.)



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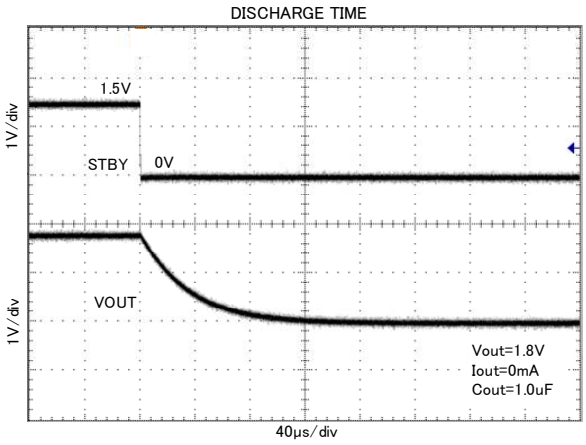
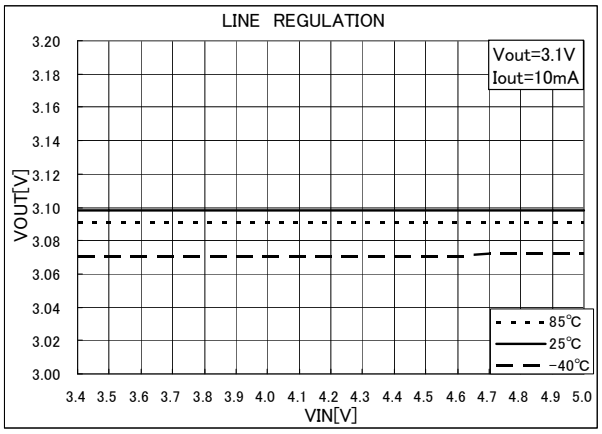


Figure 82.

● **Reference data** **BU31UA3WNVX** (Ta=25ºC unless otherwise specified.)



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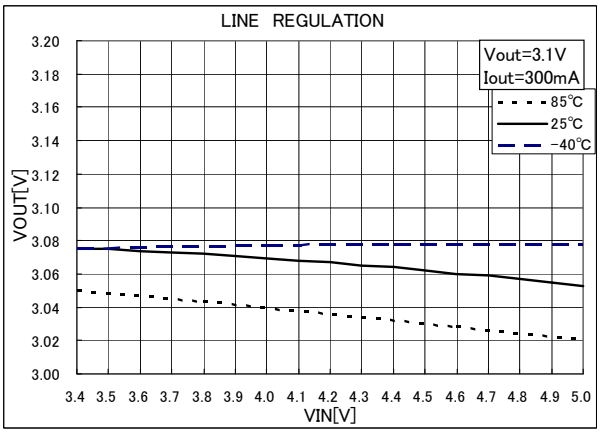

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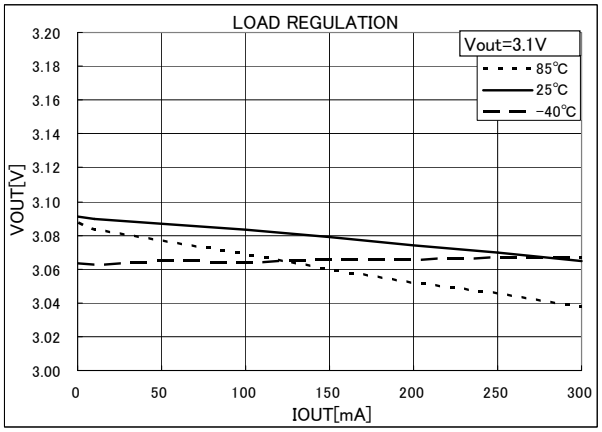

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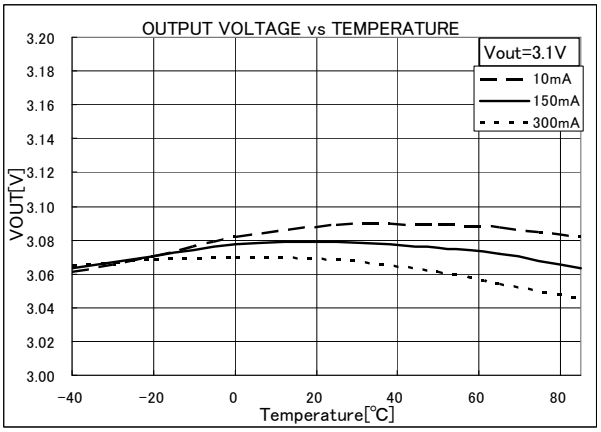

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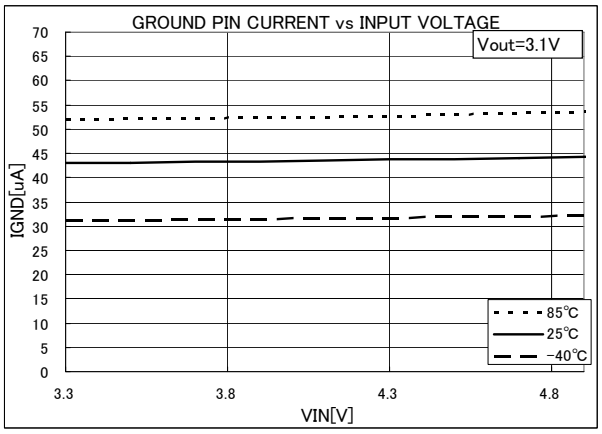

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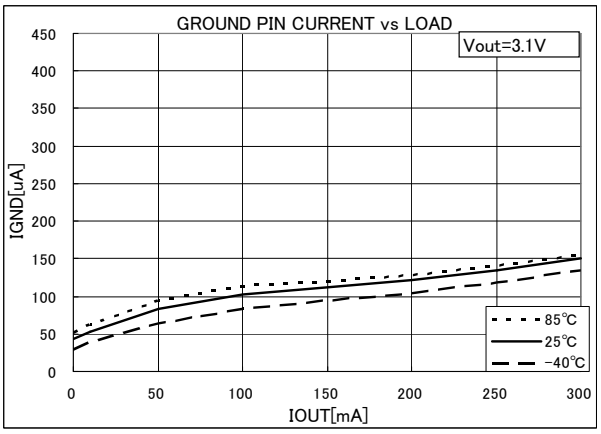

Figure 88.

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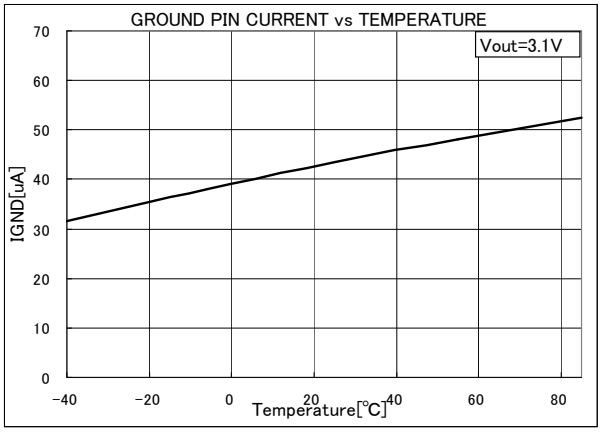
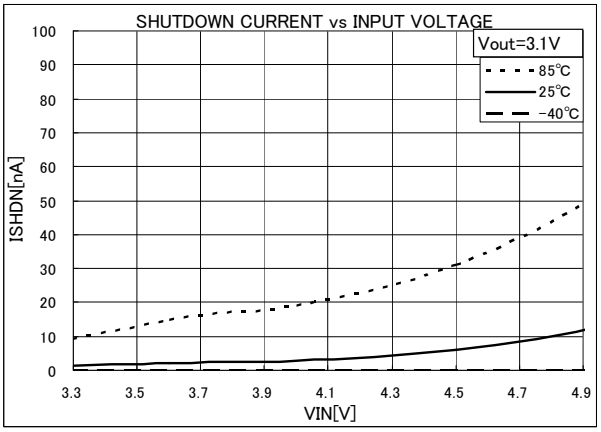


Figure 89.



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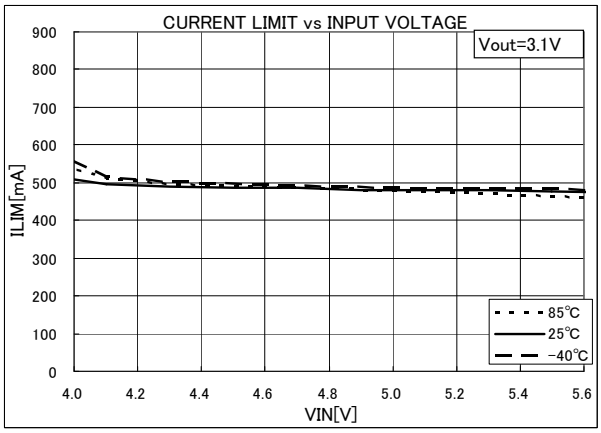

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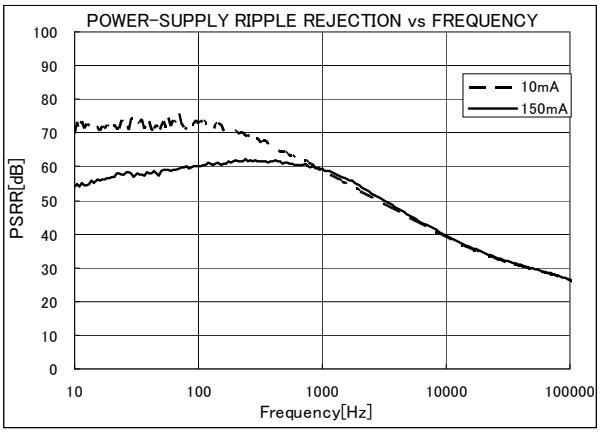

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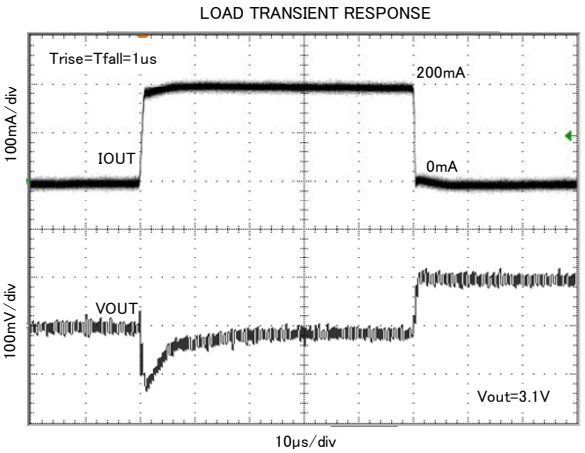


Figure 93.

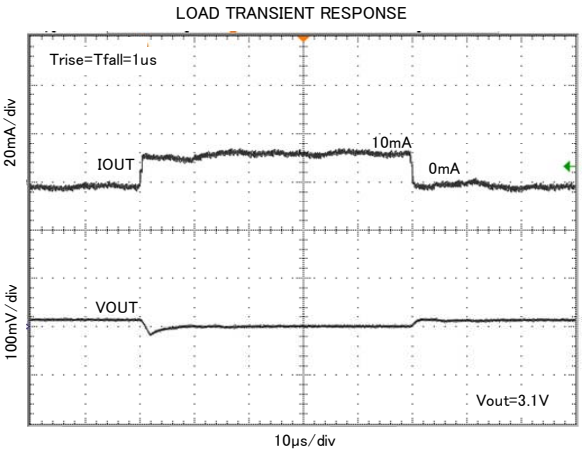


Figure 94.

● **Reference data** **BU31UA3WNVX** (Ta=25ºC unless otherwise specified.)

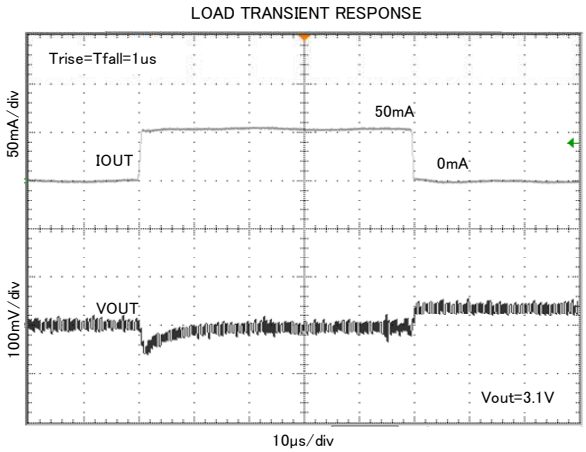


Figure 95.

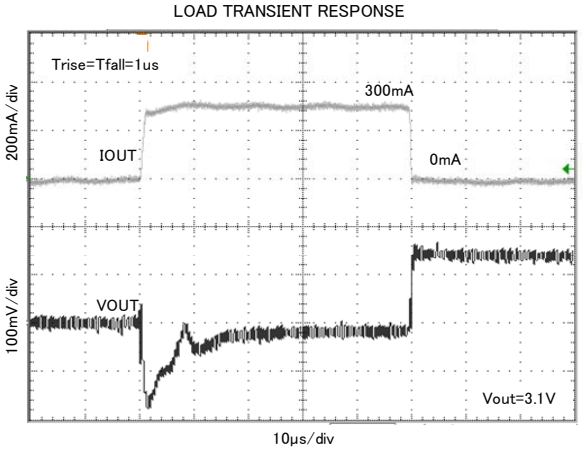


Figure 96.

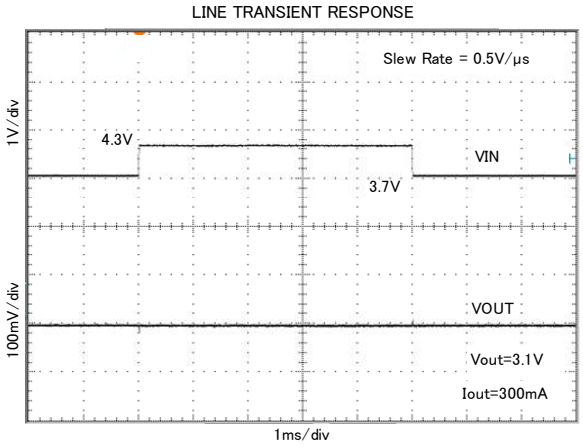


Figure 97.

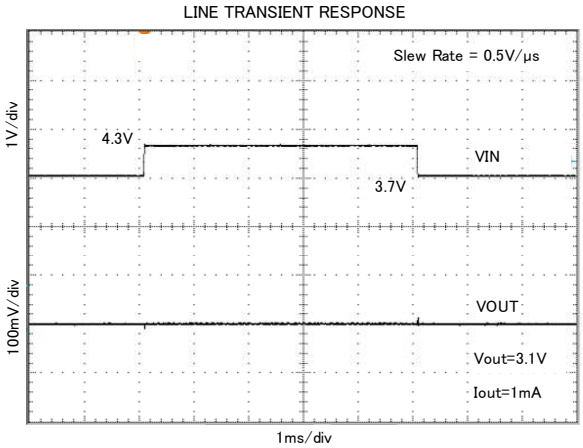


Figure 98.

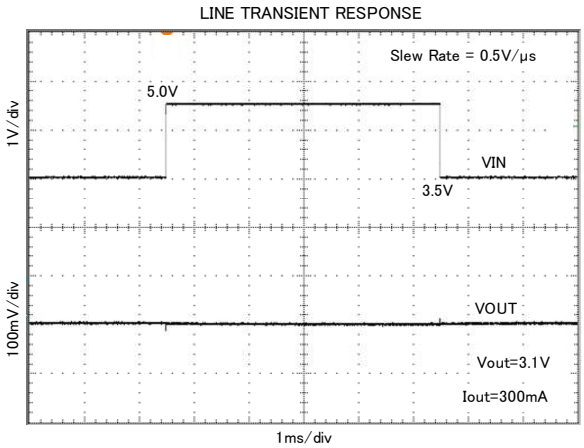


Figure 99.

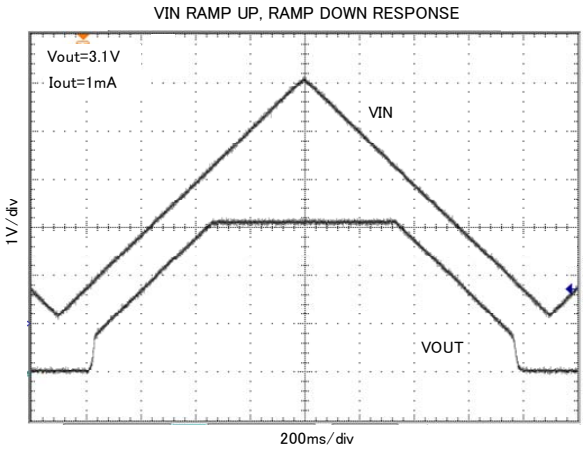


Figure 100.

● **Reference data** **BU31UA3WNVX** (Ta=25ºC unless otherwise specified.)

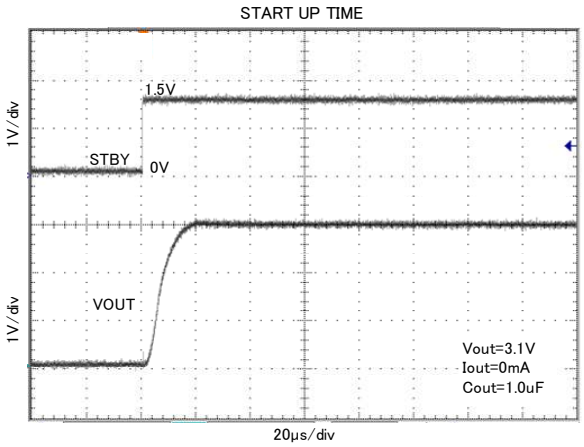


Figure 101.

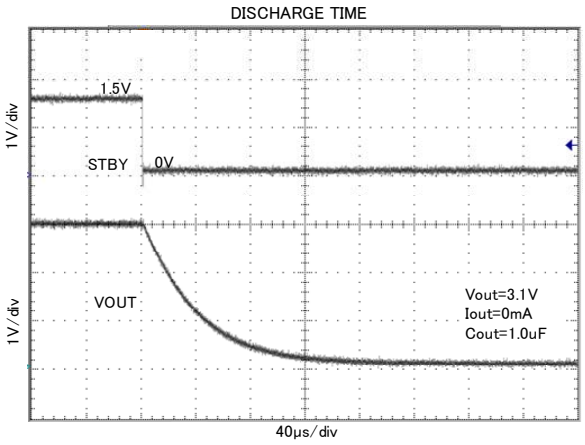


Figure 102.

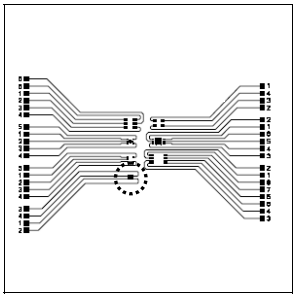
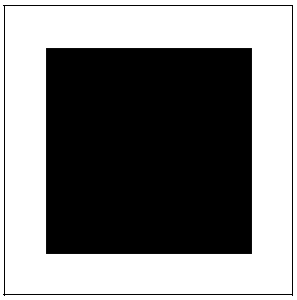
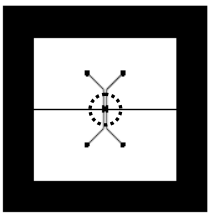
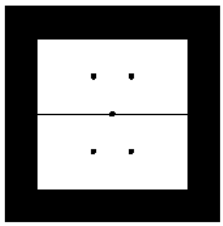
● **About power dissipation (Pd)**

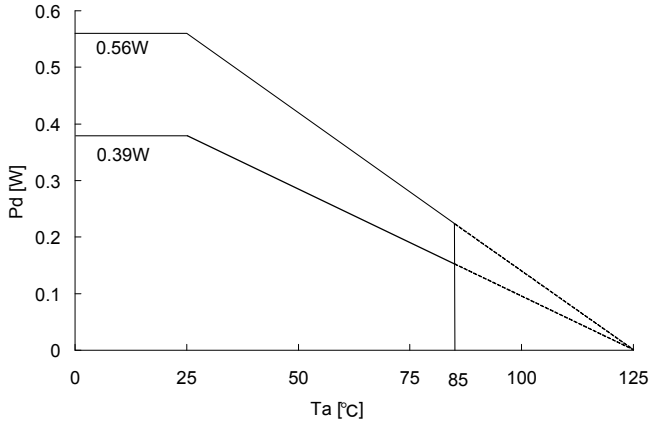
As for power dissipation, an approximate estimate of the heat reduction characteristics and internal power consumption of IC are shown, so please use these for reference. Since power dissipation changes substantially depending on the implementation conditions (board size, board thickness, metal wiring rate, number of layers and through holes, etc.), it is recommended to measure Pd on a set board. Exceeding the power dissipation of IC may lead to deterioration of the original IC performance, such as causing operation of the thermal shutdown circuit or reduction in current capability. Therefore, be sure to prepare sufficient margin within power dissipation for usage.

Calculation of the maximum internal power consumption of IC (PMAX)

PMAX=(VIN-VOUT)×IOUT(MAX.) (VIN: Input voltage VOUT: Output voltage IOUT(MAX): Maximum output current)

○ Measurement conditions

		Standard ROHM Board	Evaluation Board 1
Layout of Board for Measurement IC Implementation Position		 Top Layer (Top View)  Bottom Layer (Top View)	 Top Layer (Top View)  Bottom Layer (Top View)
Measurement State		With board implemented (Wind speed 0 m/s)	With board implemented (Wind speed 0 m/s)
Board Material		Glass epoxy resin (Double-side board)	Glass epoxy resin (Double-side board)
Board Size		70 mm x 70 mm x 1.6 mm	40 mm x 40 mm x 1.6 mm
Wiring Rate	Top layer	Metal (GND) wiring rate: Approx. 0%	Metal (GND) wiring rate: Approx. 50%
	Bottom layer	Metal (GND) wiring rate: Approx. 50%	Metal (GND) wiring rate: Approx. 50%
Through Hole		Diameter 0.5mm x 6 holes	Diameter 0.5mm x 25 holes
Power Dissipation		0.56W	0.39W
Thermal Resistance		θja=178.6°C/W	θja=256.4°C/W



* Please design the margin so that PMAX becomes is than Pd (PMAX<Pd) within the usage temperature range

Figure 103. SSON004X1010 Power dissipation heat reduction characteristics (Reference)