Chipsmall

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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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CMOS LDO Regulators for Automotive Equipments

1ch 200mA
CMOS LDO Regulators

BUxxSD2-M series

●General Description

BUxxSD2-M series are high-performance CMOS LDO regulators with output current ability of up to 200-mA. These devices have excellent noise and load response characteristics despite of its low circuit current consumption of 33μA. They are most appropriate for various applications such as power supplies for logic IC, RF, and camera modules.

●Features

- High Output Voltage Accuracy: ±2.0%
  (In all recommended conditions)
- High Ripple Rejection: 68 dB (Typ, 1 kHz,)
- Compatible with small ceramic capacitor
  (Cin=Cout=0.47 μF)
- Low Current Consumption: 33 μA
- Output Voltage ON/OFF control
- Built-in Over Current Protection Circuit (OCP)
- Built-in Thermal Shutdown Circuit (TSD)
- Package SSOP5 is similar to SOT23-5(JEDEC)

●Applications

- Automotive equipments.
- Portable devices
- Camera modules
- Other electronic devices using microcontrollers or logic circuits
- AEC-Q100 qualified

●Key Specifications

- Input Power Supply Voltage Range: 1.7V to 6.0V
- Output Current Range: 0 to 200mA
- Operating Temperature Range: -40℃ to +105℃
- Output Voltage Lineup: 1.2V,1.5V,1.8V,2.5V
  2.8V,3.0V,3.3V
- Output Voltage Accuracy: ±2.0%
- Circuit Current: 33μA(Typ.)
- Standby Current: 0μA (Typ.)

●Package

W(Typ.) x D(Typ.) x H(Max.)
SSOP5   2.90mm x 2.80mm x 1.25mm

●Typical Application Circuit
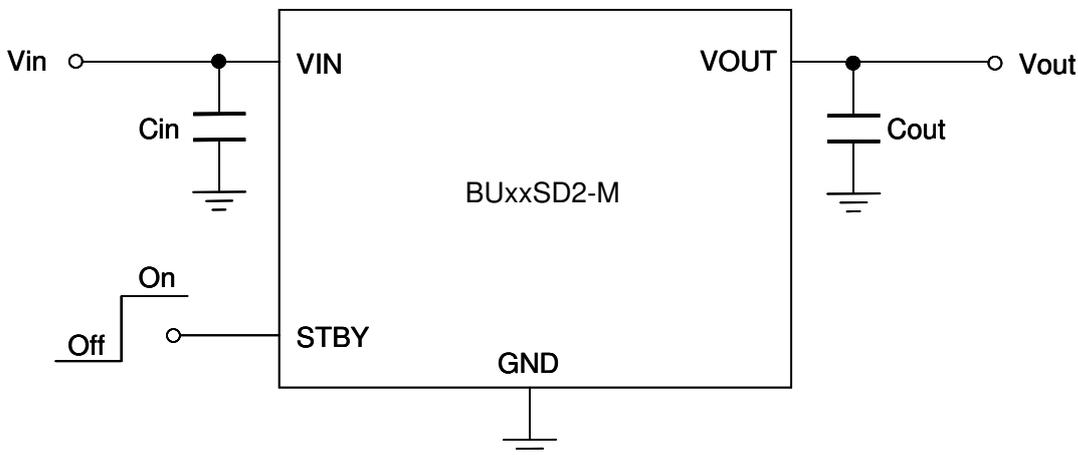
Figure 1. Typical Application Circuit

○Product structure : Silicon monolithic integrated circuit   ○This product is not designed protection against radioactive rays

●**Pin Configuration**

VOUT   N.C.

Marking

VIN GND STBY

Lot. No
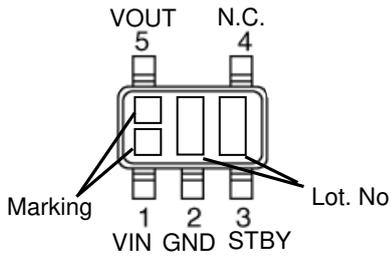
●**Pin Description**

Pin No.	Symbol	Function
1	VIN	Input Pin
2	GND	GND Pin
3	STBY	Output Control Pin (High:ON, Low:OFF)
4	N.C.	No Connect
5	VOUT	Output Pin

●**Block Diagram**

Cin(min)=0.47µF（Ceramic）
Cout(min)=0.47µF（Ceramic）

Figure 2. Block diagram

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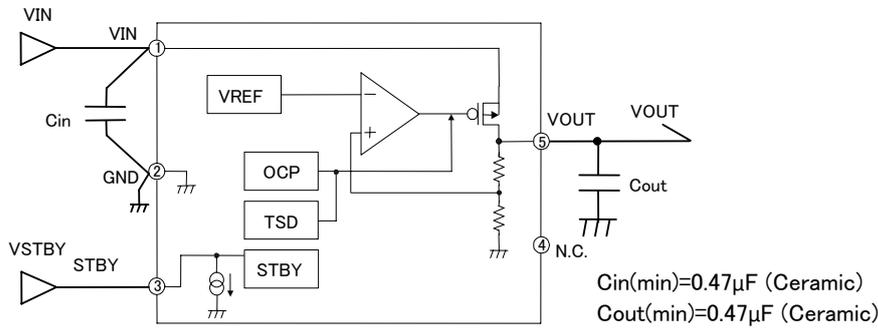
●**Absolute Maximum Ratings**

Parameter	Symbol	Rating	Unit
Maximum Power Supply Voltage Range	V_{MAX}	-0.3 to +6.5	V
Power Dissipation	Pd	540[*1]	mW
Maximum Junction Temperature	Tjmax	+125	℃
Operating Temperature Range	Topr	-40 to +105	℃
Storage Temperature Range	Tstg	-55 to +125	℃

(*1)   Derate by 5.6mW/℃ when operating above Ta=25℃.(When mounted on a board 70mm × 70mm × 1.6mm glass-epoxy board, two layer)

●**Recommended Operating Ratings**

Parameter	Symbol	Limit	Unit
Input Power Supply Voltage Range	V_{IN}	1.7 to 6.0	V
Maximum Output Current	I_{MAX}	200	mA

●**Recommended Operating Conditions**

Parameter	Symbol	Rating			Unit	Conditions
		Min.	Typ.	Max.		
Input capacitor	Cin	0.47[*2]	1.0	―	µF	A ceramic capacitor is recommended.
Output capacitor	Cout	0.47[*2]	1.0	―	µF	A ceramic capacitor is recommended.

(*2)   Set the value of the capacitor so that it does not fall below the minimum value. Take into consideration the temperature characteristics,   DC   device characteristics, and degradation with time.

●Electrical Characteristics

(Unless otherwise noted, Ta=-40 to 105℃, $V_{IN}=V_{OUT}+1.0V^{(*3)}$, $V_{STBY}=1.5V$, Cin=1μF, Cout=1μF.)

PARAMETER		Symbol	Limit			Unit	Conditions
			MIN.	TYP.	MAX.		
Output Voltage		V_{OUT}	V_{OUT} ×0.98	V_{OUT}	V_{OUT} ×1.02	V	I_{OUT}=0 to 200mA, $V_{OUT}\geqq2.5V$, $V_{IN}=V_{OUT}+0.5$ to 6.0V $V_{OUT}<2.5V$, $V_{IN}=3.0$ to 6.0V Ta=-40 to +105℃ $^{(*4,5,6)}$
Line Regulation		V_{DLI}	-	4	10	mV	I_{OUT}=10mA $V_{OUT}\leqq2.5V$, $V_{IN}=3.0$ to 6.0V
				6	15	mV	I_{OUT}=10mA $V_{OUT}>2.5V$, $V_{IN}=V_{OUT}+0.5$ to 6.0V
Load Regulation1		V_{DLO1}	-	0.5	5	mV	I_{OUT}=1 to 100mA
Load Regulation2		V_{DLO2}	-	1	10	mV	I_{OUT}=1 to 200mA
Dropout Voltage		V_{DROP}	-	400	700	mV	$1.0V\leqq V_{OUT}<1.2V$, I_{OUT}=100mA
			-	280	550	mV	$1.2V\leqq V_{OUT}<1.5V$, I_{OUT}=100mA
			-	180	370	mV	$1.5V\leqq V_{OUT}<1.7V$, I_{OUT}=100mA
			-	150	290	mV	$1.7V\leqq V_{OUT}<2.1V$, I_{OUT}=100mA
			-	110	220	mV	$2.1V\leqq V_{OUT}<2.5V$, I_{OUT}=100mA
			-	100	180	mV	$2.5V\leqq V_{OUT}<2.8V$, I_{OUT}=100mA
			-	85	150	mV	$2.8V\leqq V_{OUT}$, I_{OUT}=100mA
Maximum Output Current		I_{OMAX}	200	-	-	mA	$V_{IN}=V_{OUT}+1.0V$ $^{(*3)}$
Limit Current		I_{LMAX}	250	400	-	mA	$V_{O}=V_{OUT}×0.98$, Ta=25℃
Short Current		I_{SHORT}	-	100	200	mA	V_{O}=0V, Ta=25℃
Circuit Current		I_{GND}	-	33	80	μA	I_{OUT}=0mA
Circuit Current (STBY)		I_{CCST}	-	-	2.0	μA	V_{STBY}=0V
Ripple Rejection Ratio		R.R.	-	68	-	dB	V_{RR}=-20dBv,f_{RR}=1kHz,I_{OUT}=10mA
Load Transient Response		V_{LOT}	-	±65	-	mV	I_{OUT}=1 to 150mA,Trise=Tfall=1μs, $V_{IN}=V_{OUT}+1.0V$ $^{(*5)}$
Line Transient Response		V_{LIT}	-	±5	-	mV	$V_{IN}=V_{OUT}+0.5$ to $V_{OUT}+1.0V$, Trise=Tfall =10μs
Output Noise Voltage		V_{NOIS}	-	30	-	μVrms	Bandwidth 10 to 100kHz
Startup Time		T_{ST}	-	100	300	μsec	Output Voltage settled within tolerances $^{(*7)}$
STBY Control Voltage	ON	V_{STBH}	1.1	-	V_{IN}	V	Ta=25℃
	OFF	V_{STBL}	-0.2	-	0.5	V	
STBY Pin Current		I_{STBY}	-	-	4.0	μA	

(*3) V_{IN}=3.5V for $V_{OUT}<2.5V$.

(*4) Operating Conditions are limited by Pd.

(*5) Typical values apply for Ta=25℃.

(*6) V_{IN}=3.0V to 6.0V for $V_{OUT}<2.5V$.

(*7) Startup time=time from EN assertion to $V_{OUT}×0.98$

●**Reference data BU12SD2MG-M (Unless otherwise specified, Ta=25℃.)**
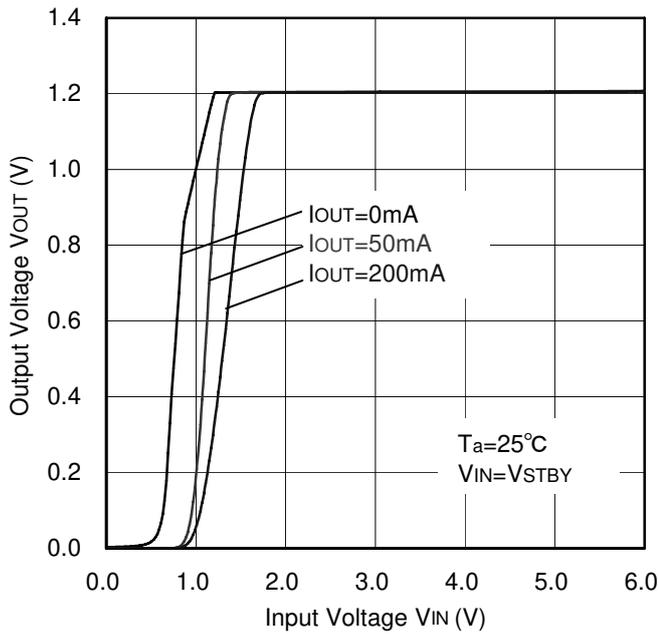
Figure 3. Output Voltage vs. Input Voltage
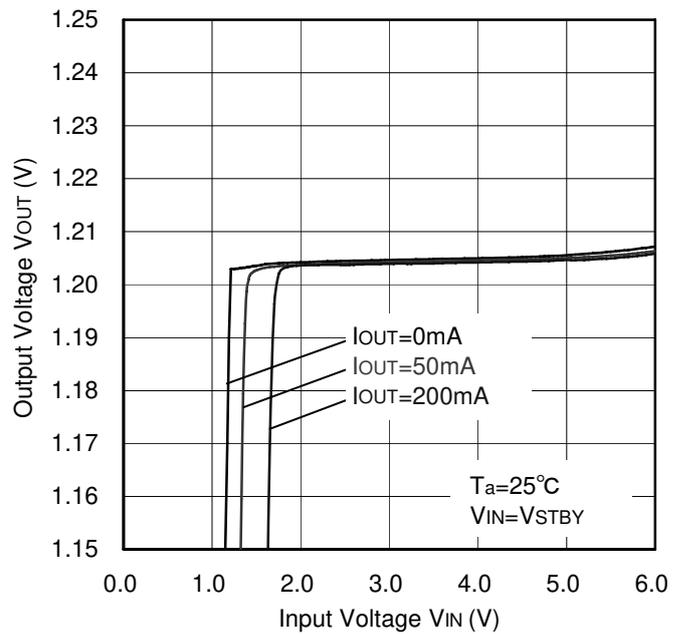
Figure 4. Line Regulation
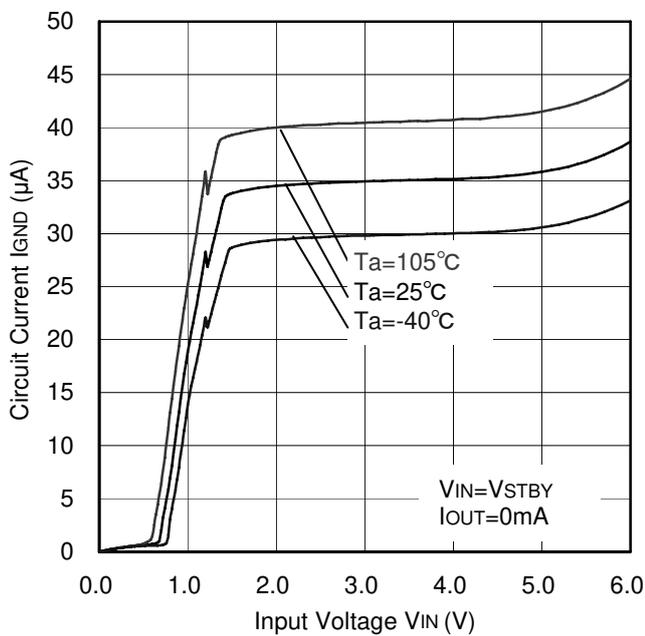
Figure 5. Circuit Current vs. Input Voltage
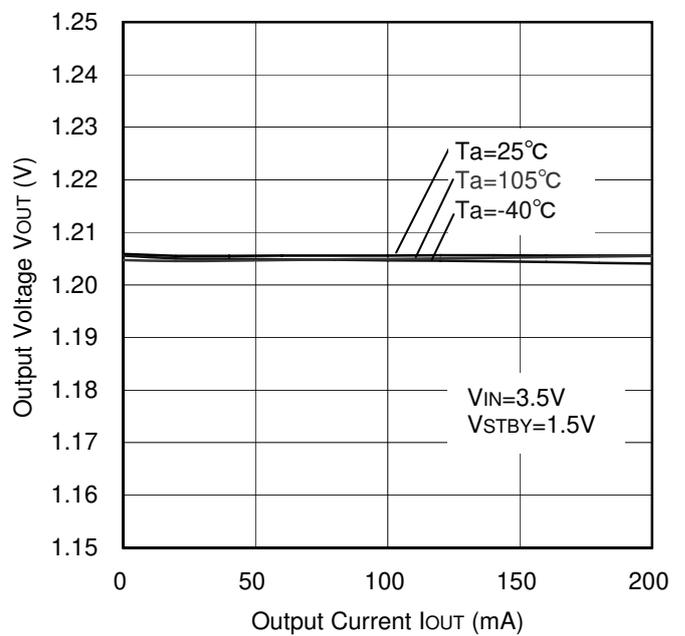
Figure 6. Load Regulation

●**Reference data BU12SD2MG-M (Unless otherwise specified, Ta=25℃.)**
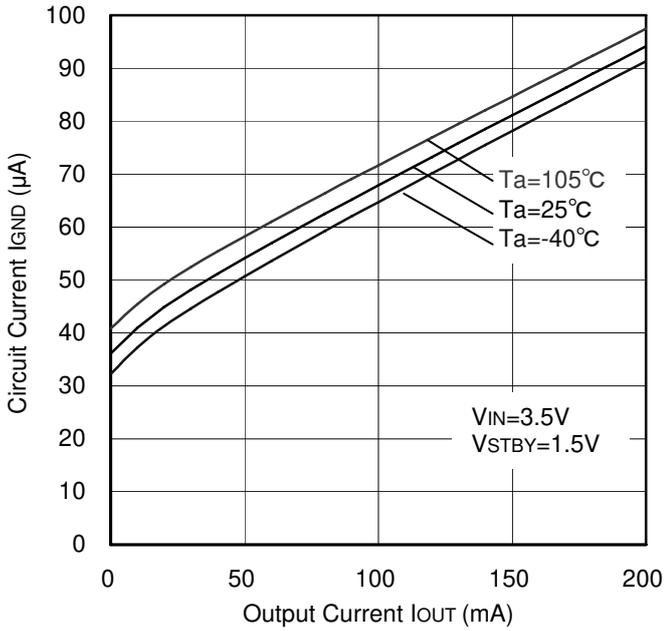
Figure 7. Circuit Current vs. Output Current
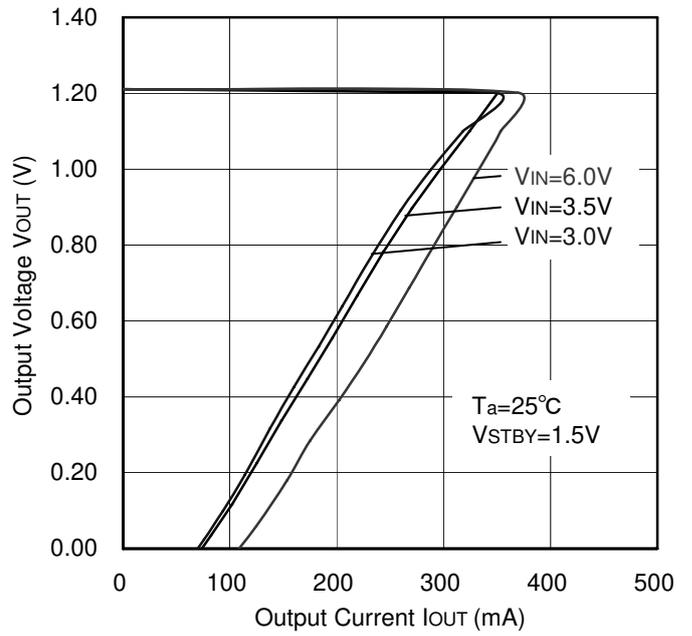
Figure 8. OCP Threshold
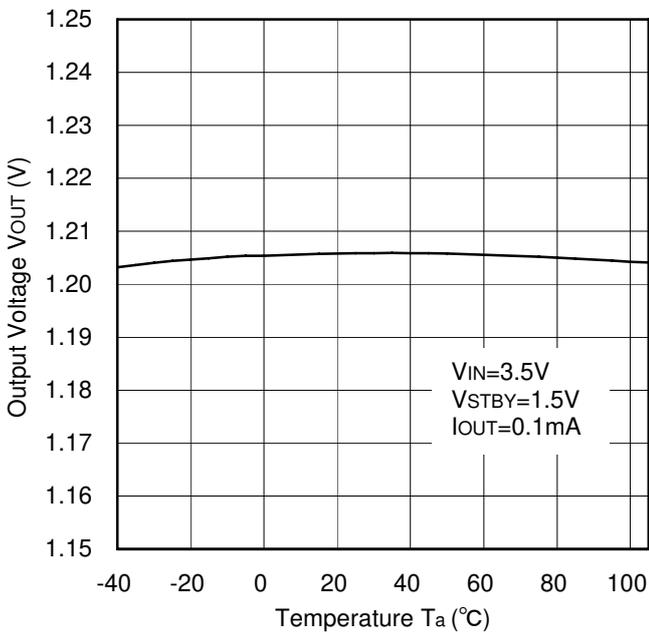
Figure 9. Output Voltage vs. Temperature
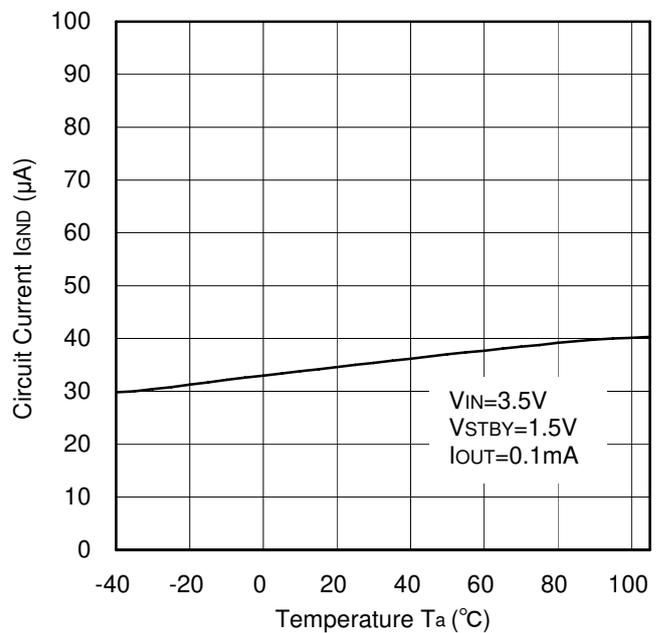
Figure 10. Circuit Current vs. Temperature

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●**Reference data BU12SD2MG-M (Unless otherwise specified, Ta=25℃.)**
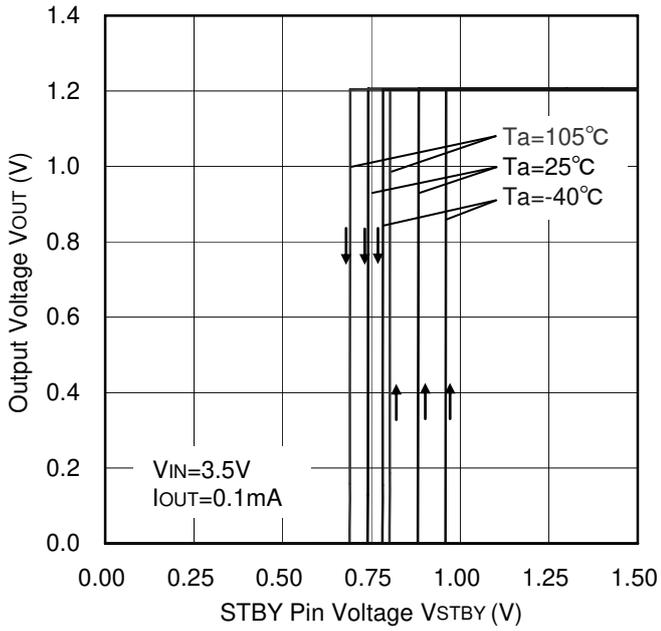
Figure 11. STBY Threshold
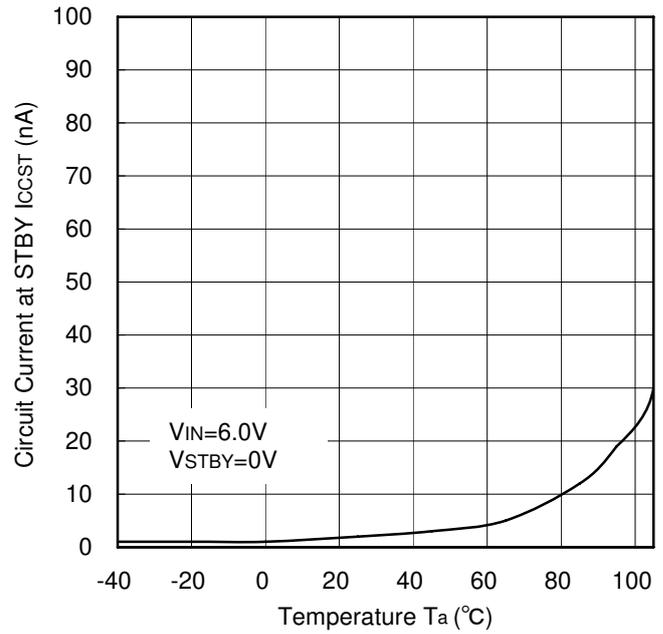


Figure 12. Circuit Current (at STBY) vs. Temperature
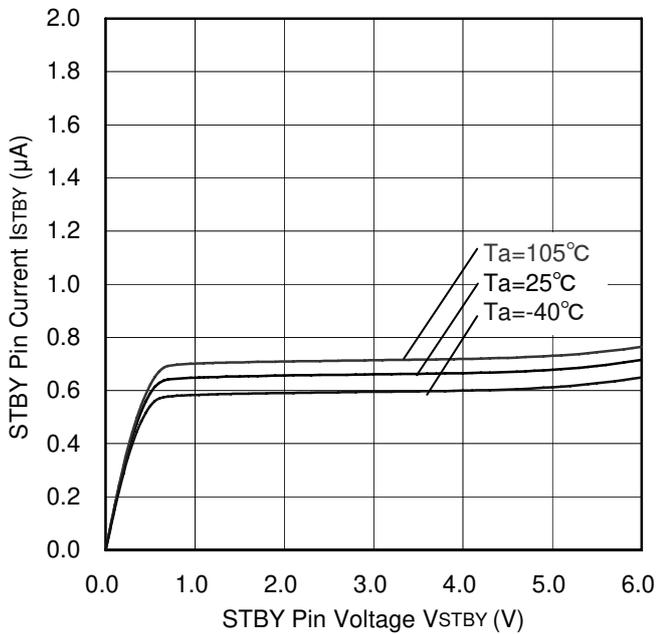
Figure 13. STBY Pin Current vs. STBY Pin Voltage

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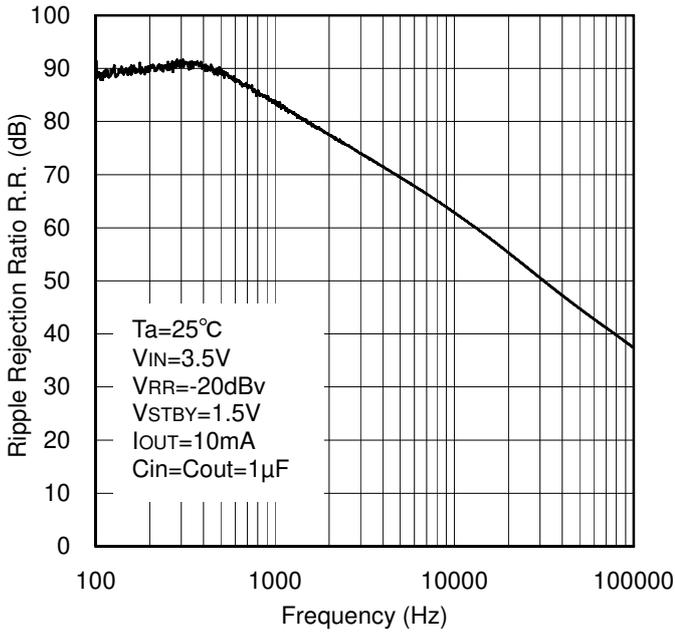
Figure 14. Ripple Rejection Ratio vs. Frequency
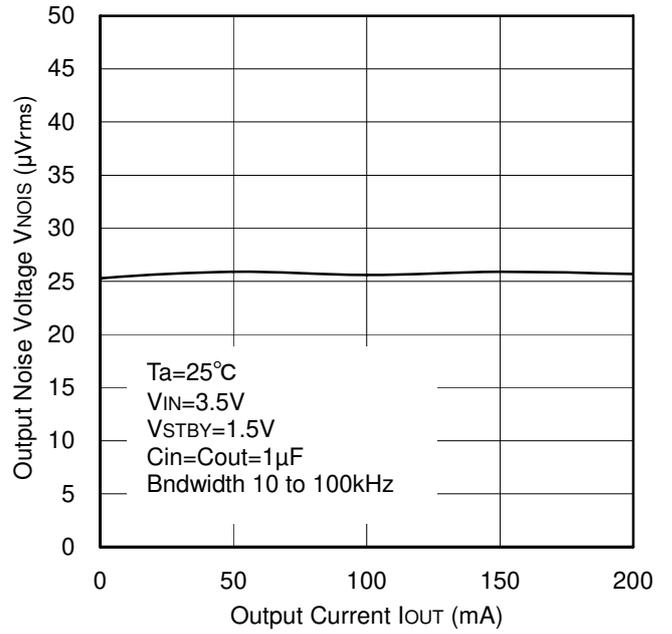
Figure 15. Output Noise Voltage vs. Output Current
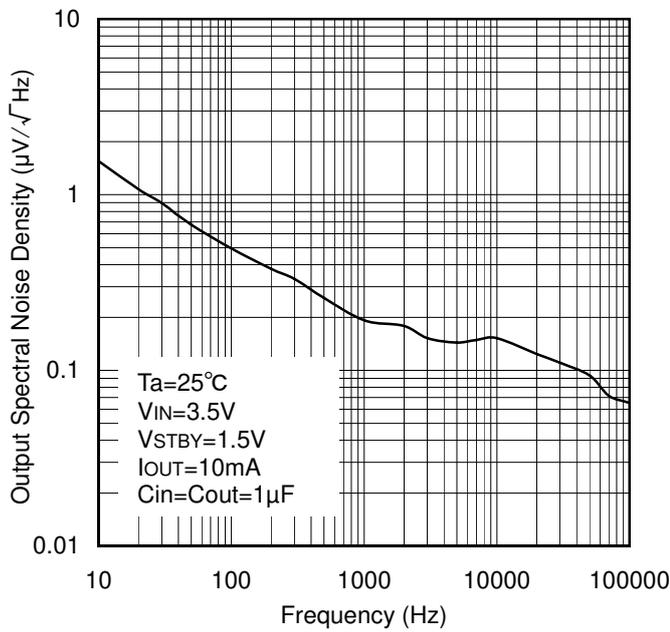
Figure 16.Output Spectral Noise Density vs. Frequency

●**Reference data BU12SD2MG-M (Unless otherwise specified, Ta=25℃.)**
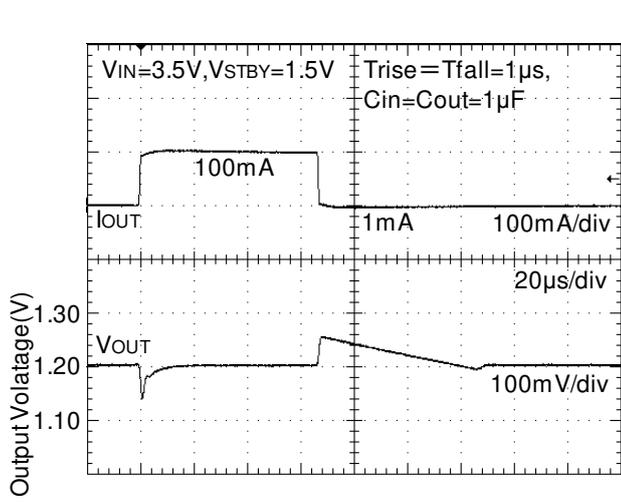
Figure 17. Load Response
(1mA to 100mA)
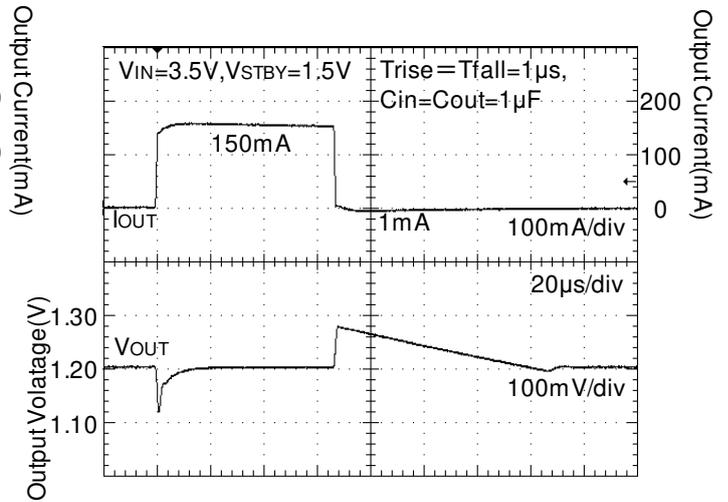
Figure 18. Load Response
(1mA to 150mA)
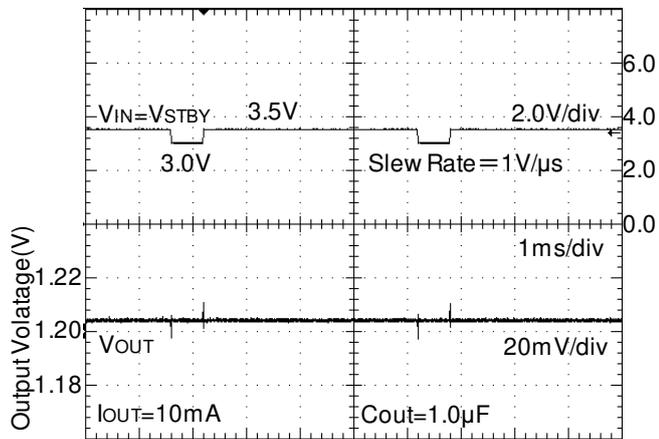

Figure 19. Line Transient Response
(3.0 to 3.5V)
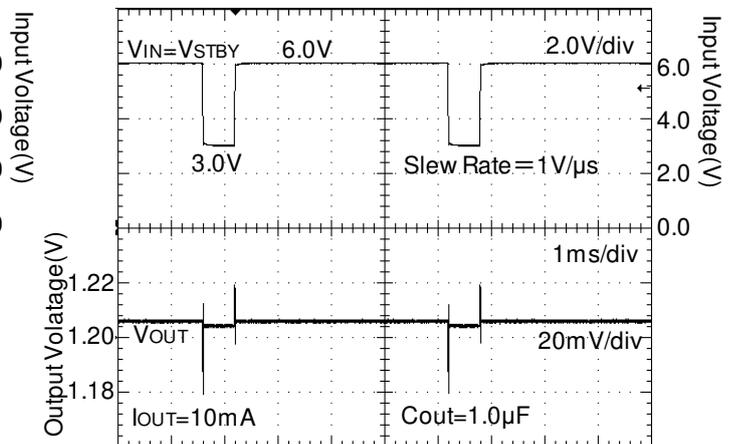
Figure 20. Line Transient Response
(3.0 to 6.0V)

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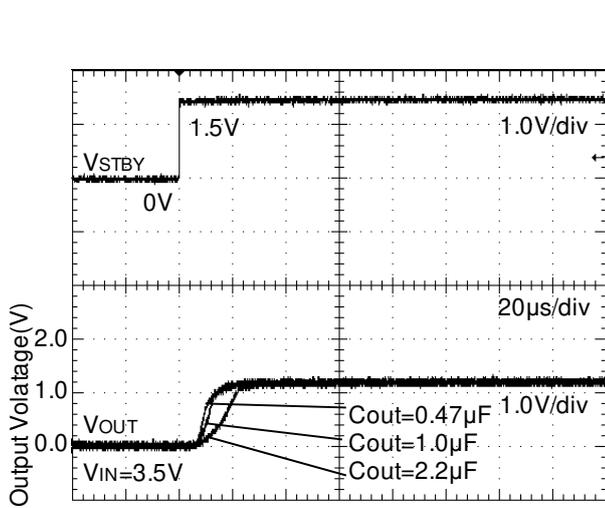

Figure 21. Startup Time
(R$_{OUT}$=none)
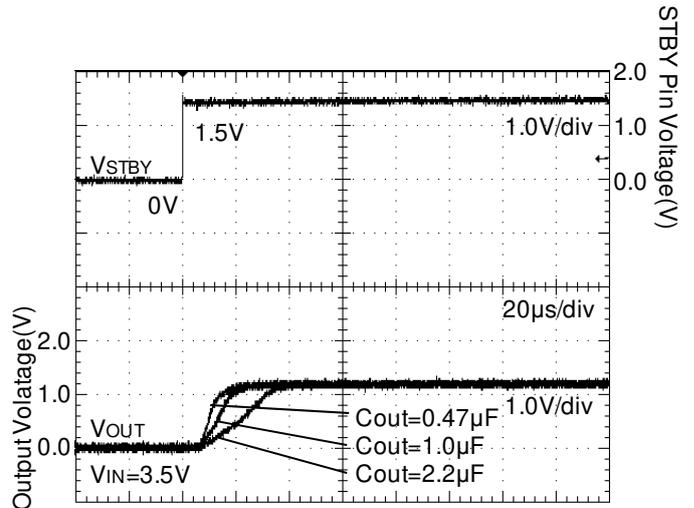

Figure 22. Startup Time
(R$_{OUT}$=6Ω)
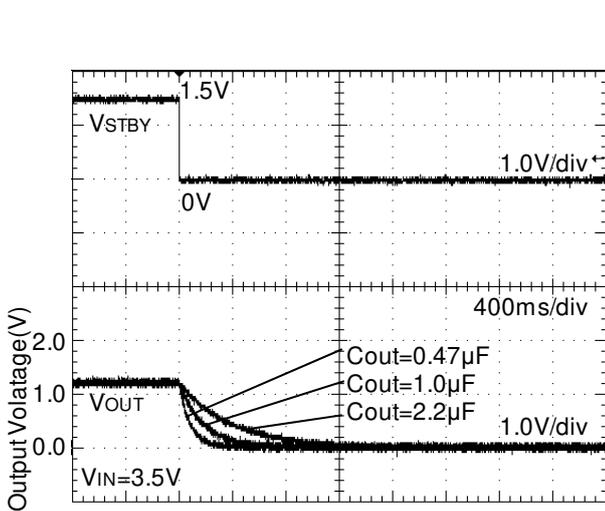
Figure 23. Discharge Time
(R$_{OUT}$=none)
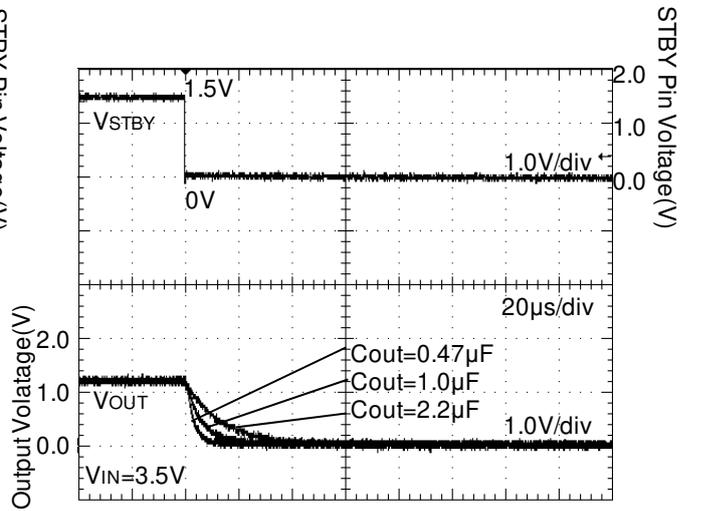
Figure 24. Discharge Time
(R$_{OUT}$=6Ω)

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●**Reference data BU18SD2MG-M (Unless otherwise specified, Ta=25℃.)**
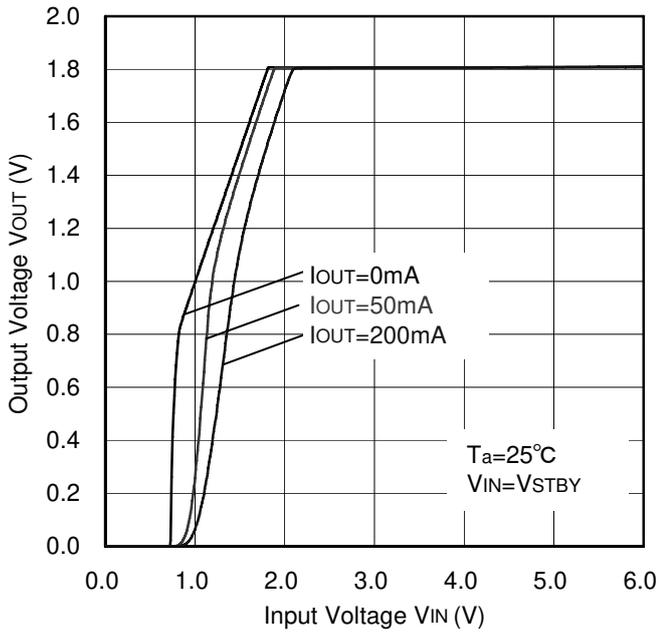

Figure 25. Output Voltage vs. Input Voltage
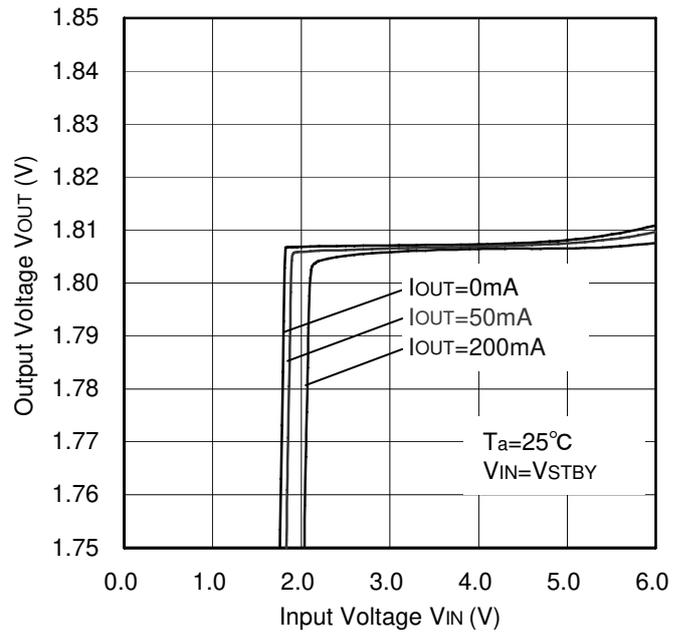
Figure 26. Line Regulation
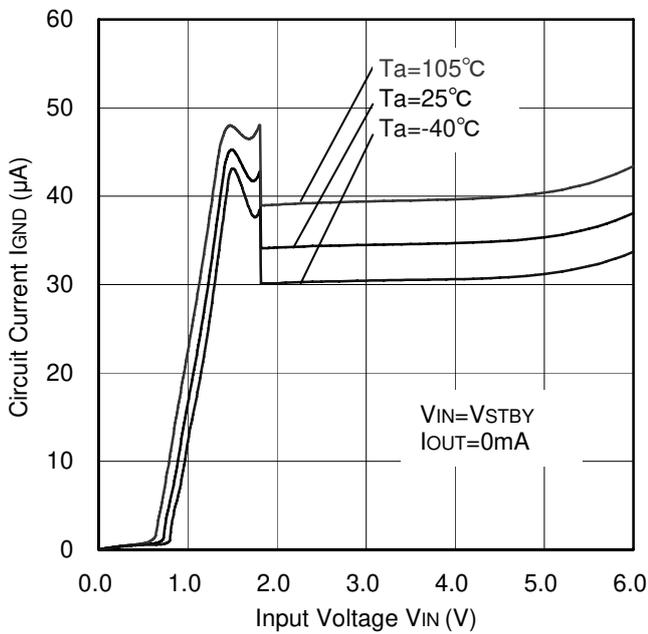
Figure 27. Circuit Current vs. Input Voltage
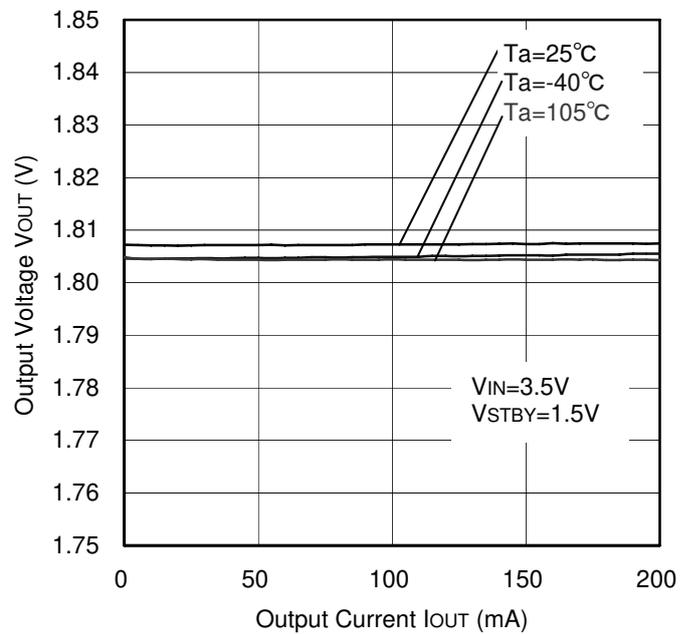
Figure 28. Load Regulation

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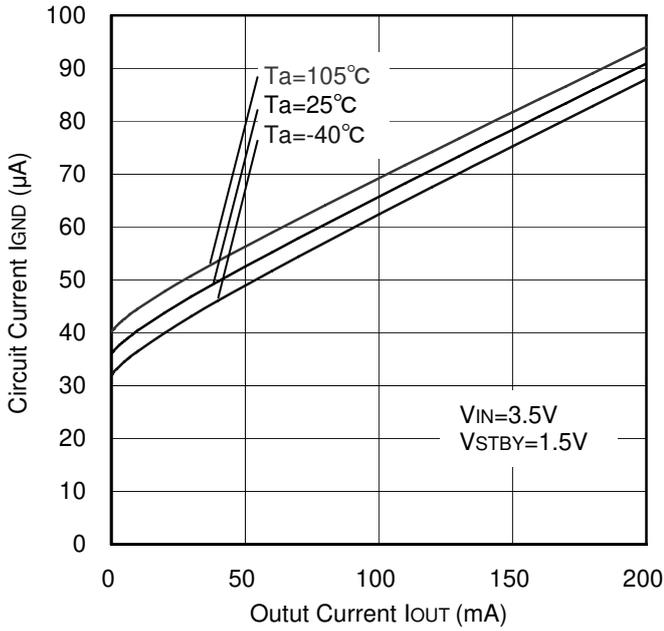
Figure 29. Circuit Current vs. Output Current
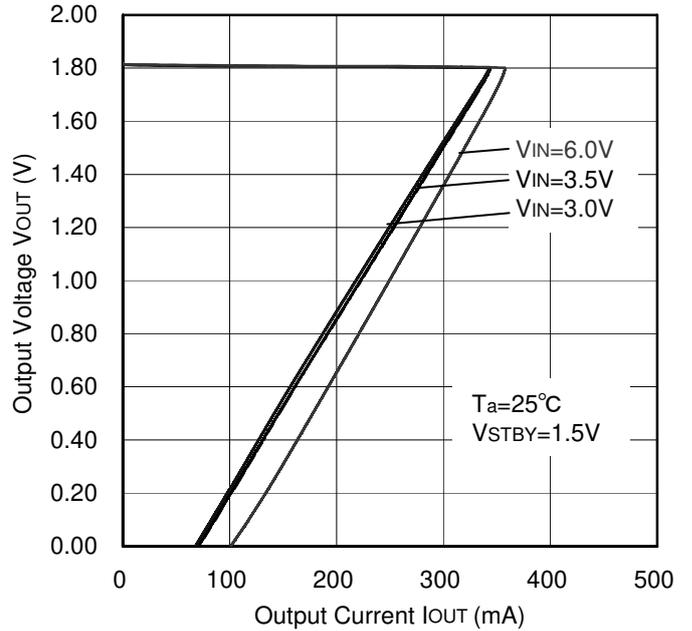
Figure 30. OCP Threshold
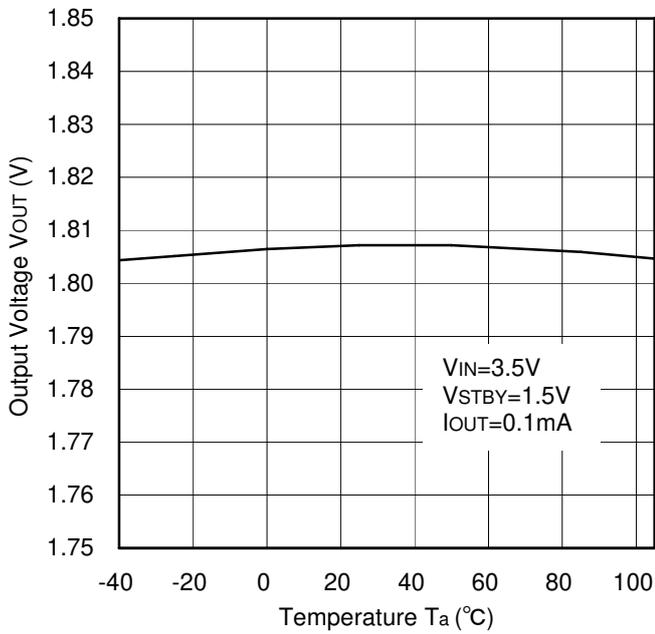
Figure 31. Output Voltage vs. Temperature
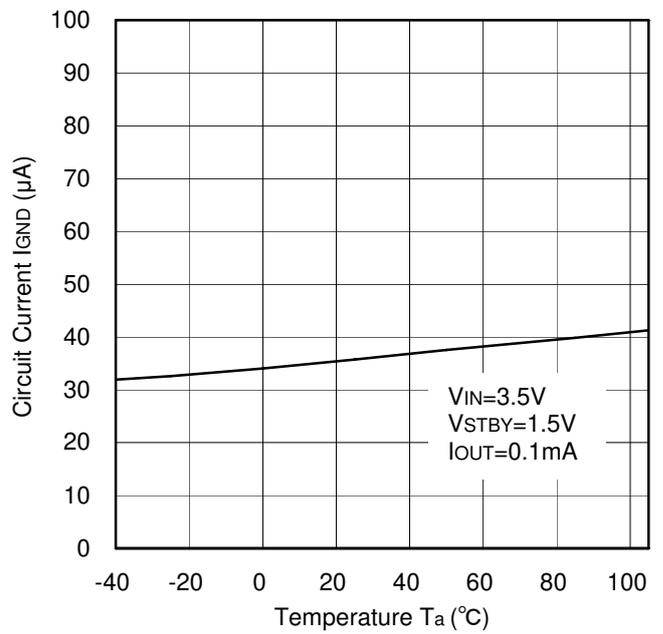
Figure 32. Circuit Current vs. Temperature

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●Reference data BU18SD2MG-M (Unless otherwise specified, Ta=25℃.)

Figure 33. STBY Threshold
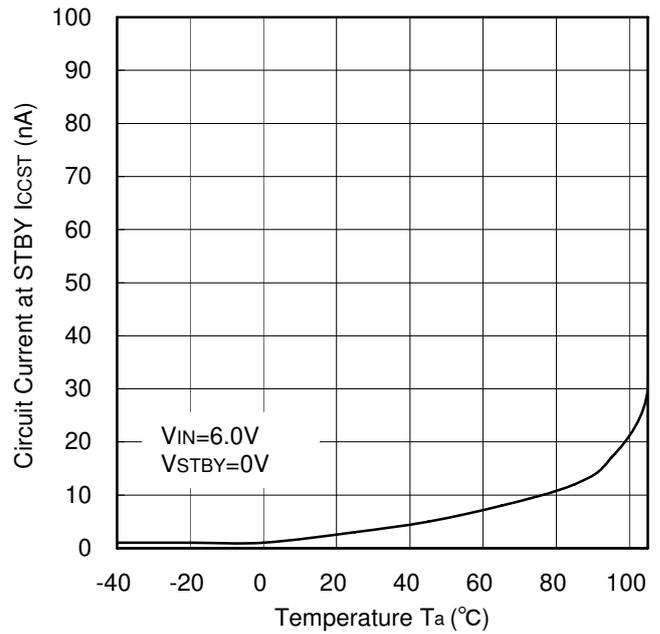
Figure 34. Circuit Current (at STBY) vs. Temperature
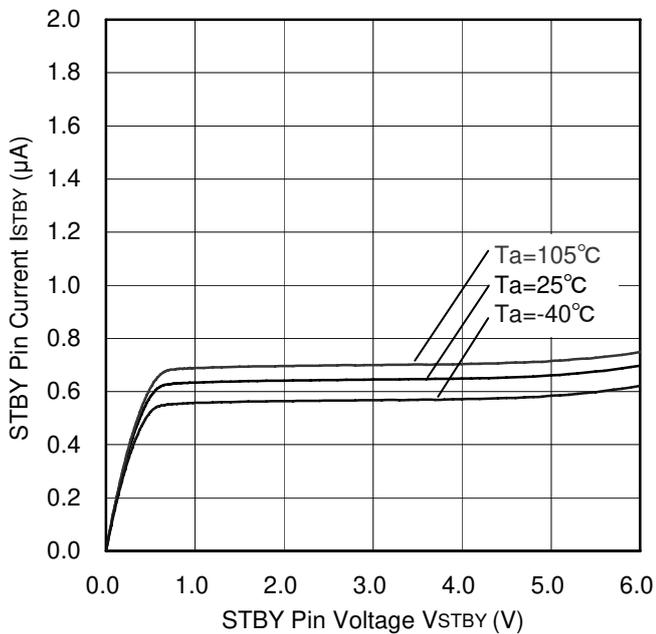
Figure 35. STBY Pin Current vs. STBY Pin Voltage

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●**Reference data BU18SD2MG-M (Unless otherwise specified, Ta=25℃.)**
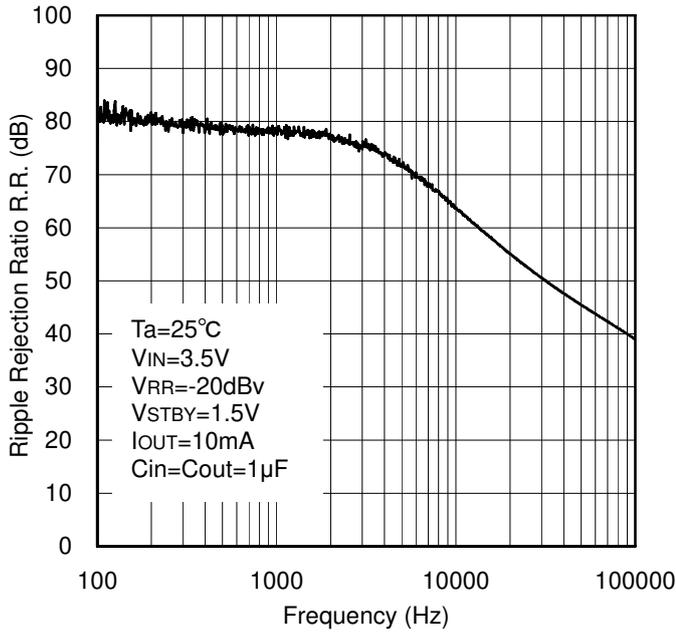
Figure 36. Ripple Rejection Ratio vs. Frequency
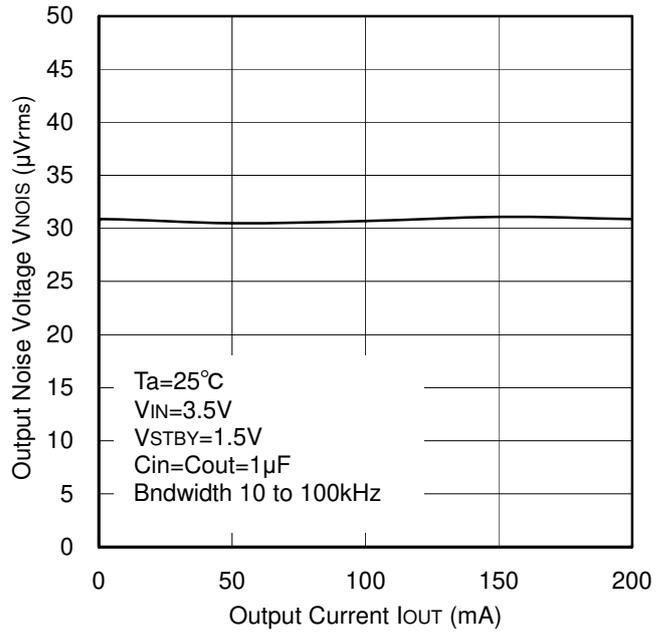
Figure 37. Output Noise Voltage vs. Output Current
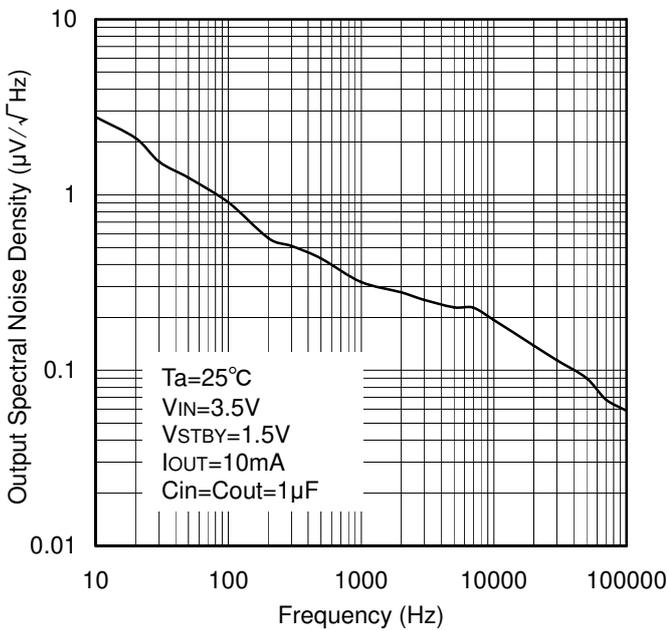
Figure 38.Output Spectral Noise Density vs. Frequency

●**Reference data BU18SD2MG-M (Unless otherwise specified, Ta=25℃.)**
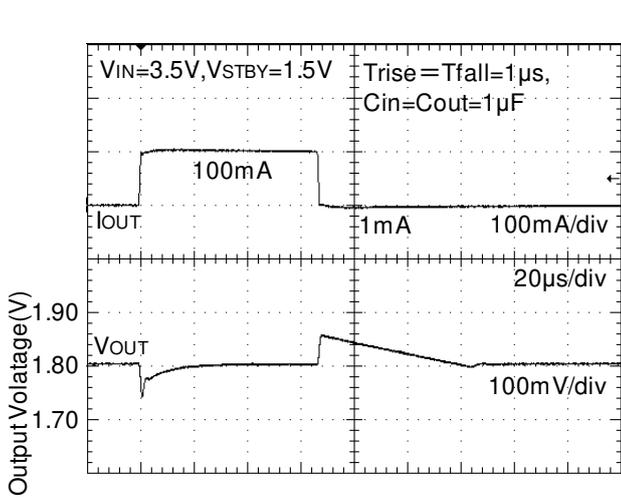

Figure 39. Load Response
(1mA to 100mA)
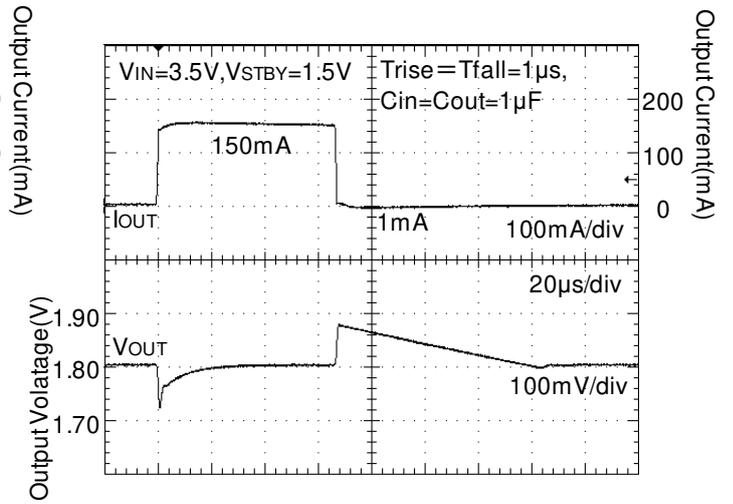
Figure 40. Load Response
(1mA to 150mA)
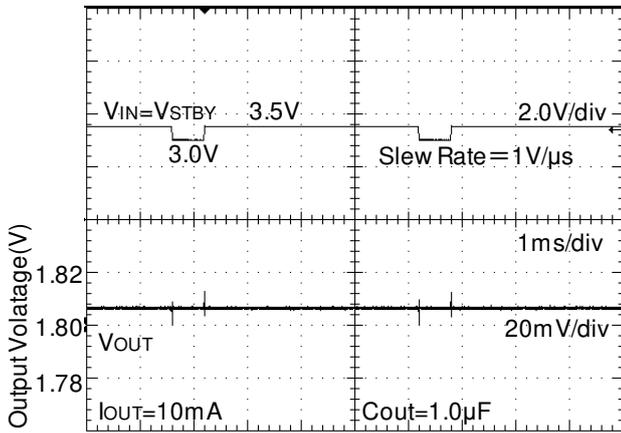
Figure 41. Line Transient Response
(3.0 to 3.5V)
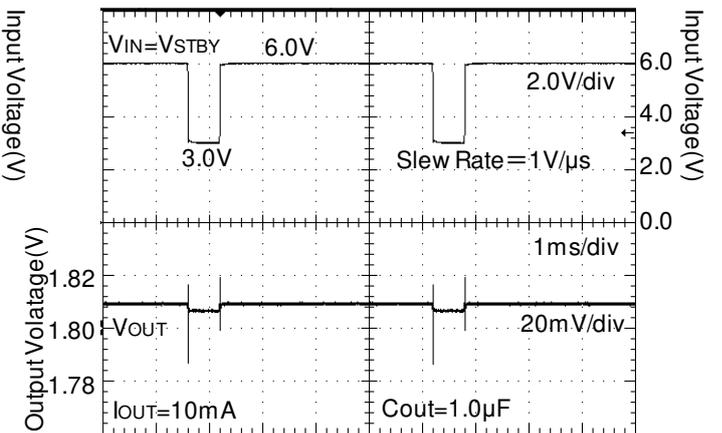
Figure 42. Line Transient Response
(3.0 to 6.0V)

●**Reference data BU18SD2MG-M (Unless otherwise specified, Ta=25℃.)**
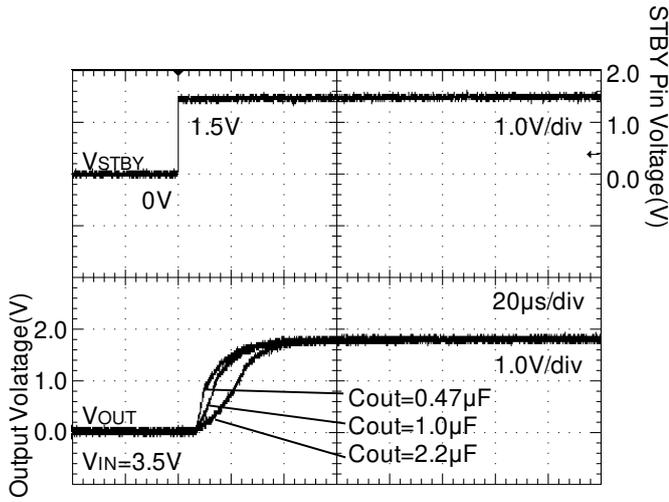
Figure 43. Startup Time
(R~OUT~=none)
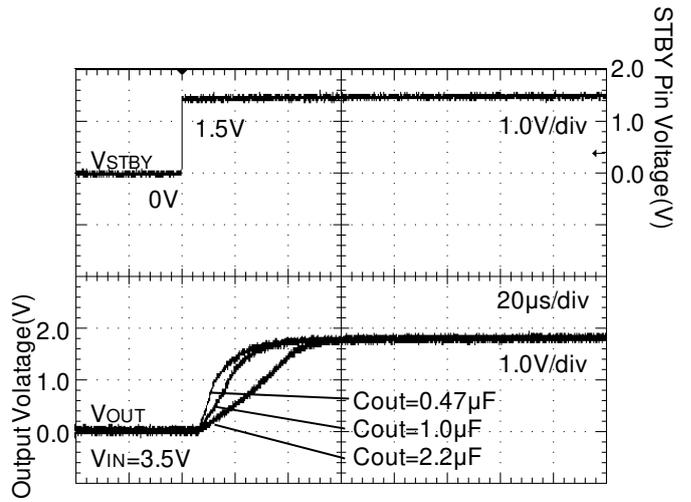
Figure 44. Startup Time
(R~OUT~=9Ω)
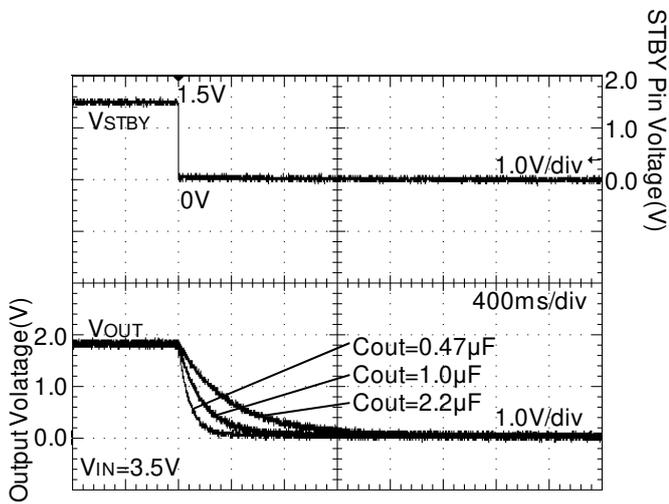
Figure 45. Discharge Time
(R~OUT~=none)
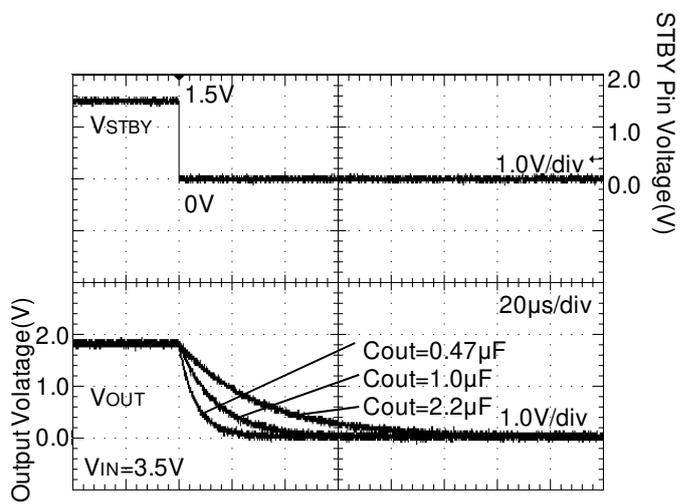
Figure 46. Discharge Time
(R~OUT~=9Ω)

●**Reference data BU25SD2MG-M (Unless otherwise specified, Ta=25℃.)**
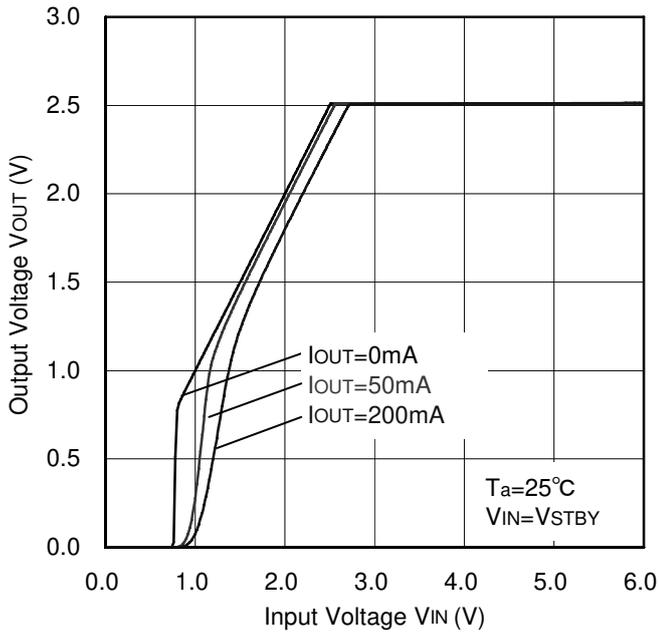
Figure 47. Output Voltage vs. Input Voltage
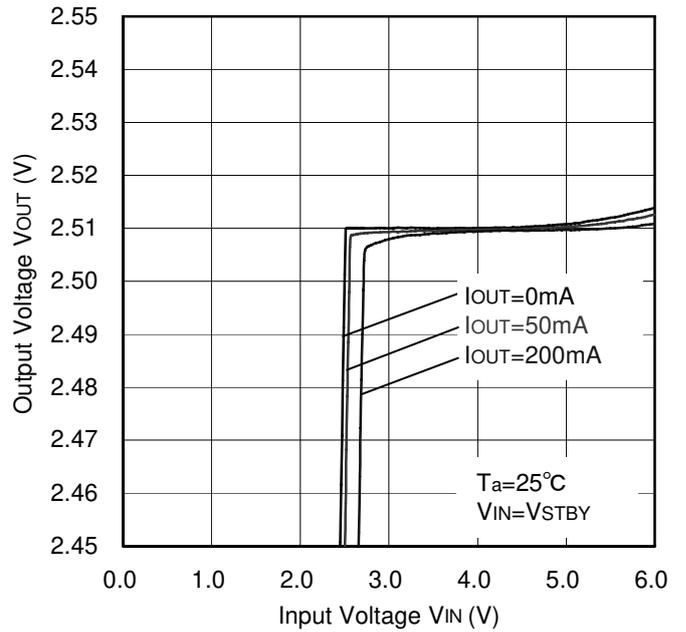
Figure 48. Line Regulation
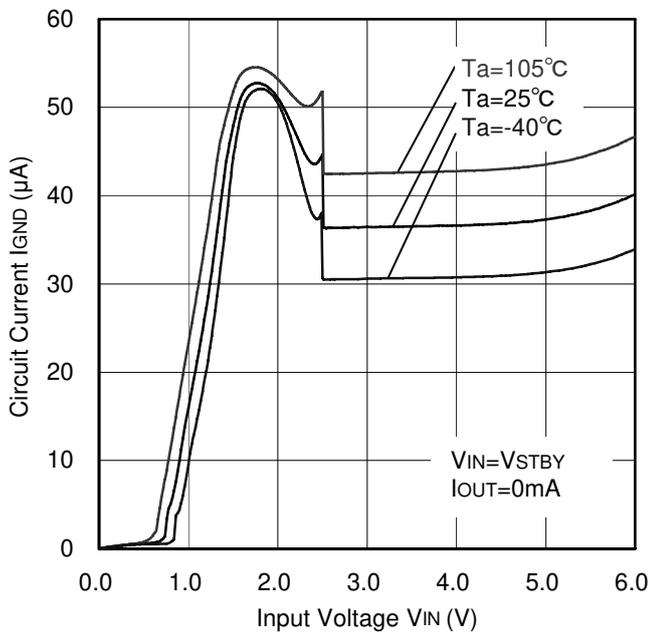
Figure 49. Circuit Current vs. Input Voltage
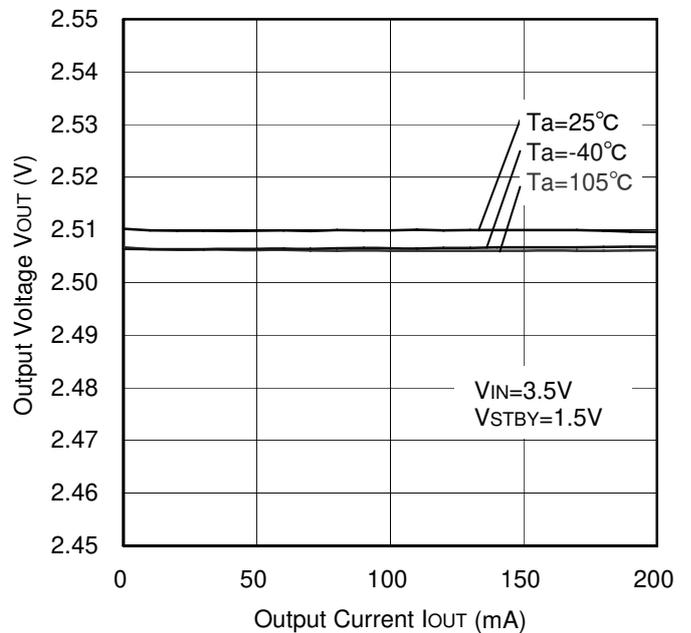
Figure 50. Load Regulation

●**Reference data BU25SD2MG-M (Unless otherwise specified, Ta=25℃.)**
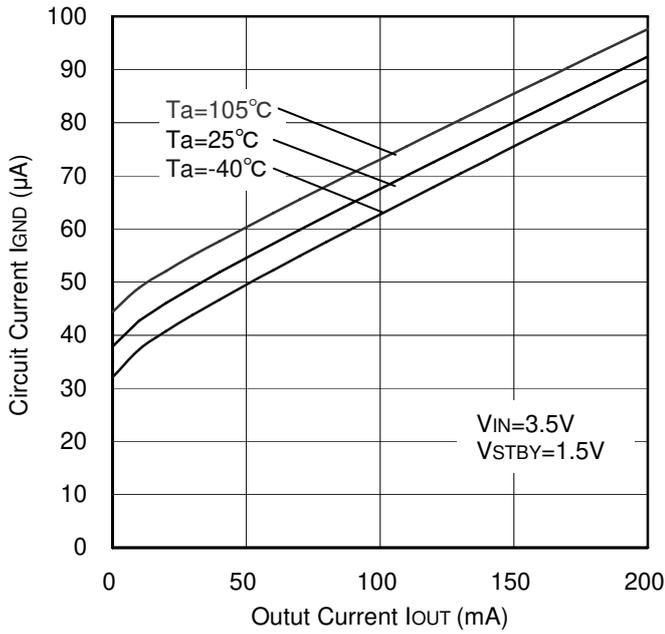
Figure 51. Circuit Current vs. Output Current
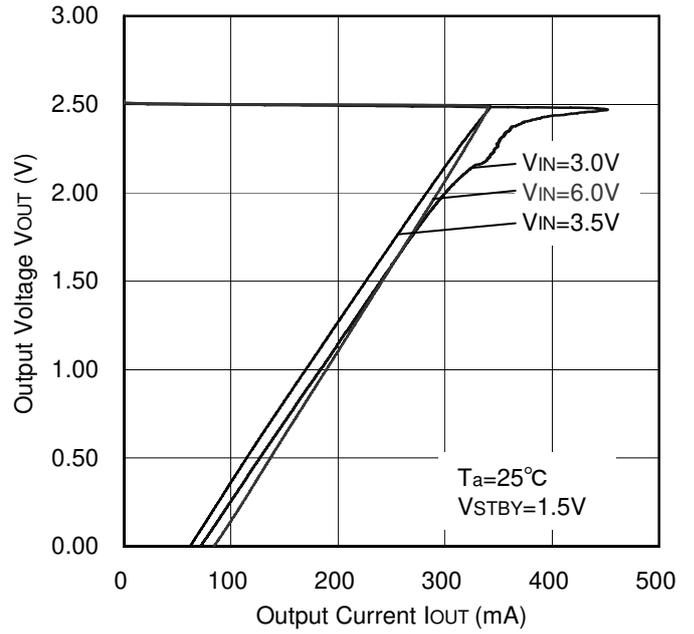
Figure 52. OCP Threshold
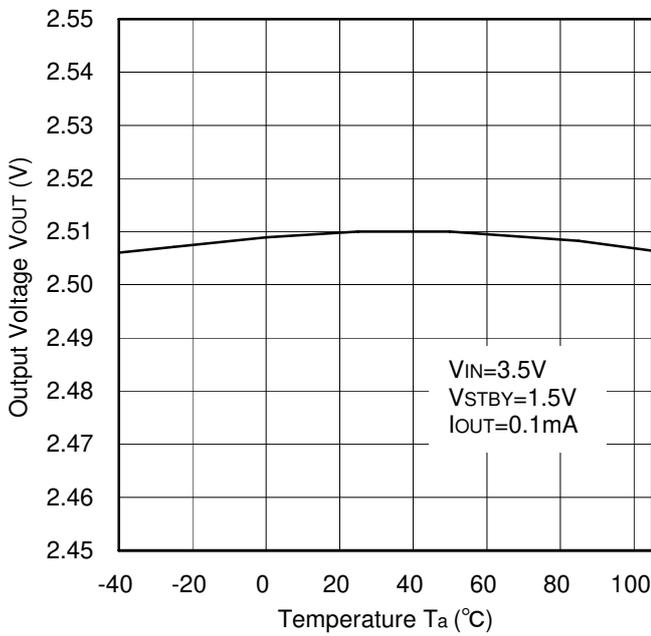
Figure 53. Output Voltage vs. Temperature
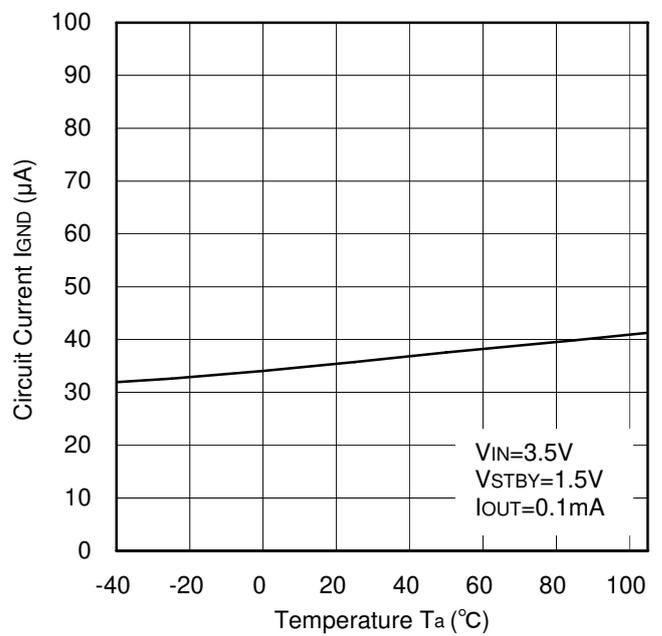
Figure 54. Circuit Current vs. Temperature

●**Reference data BU25SD2MG-M (Unless otherwise specified, Ta=25℃.)**
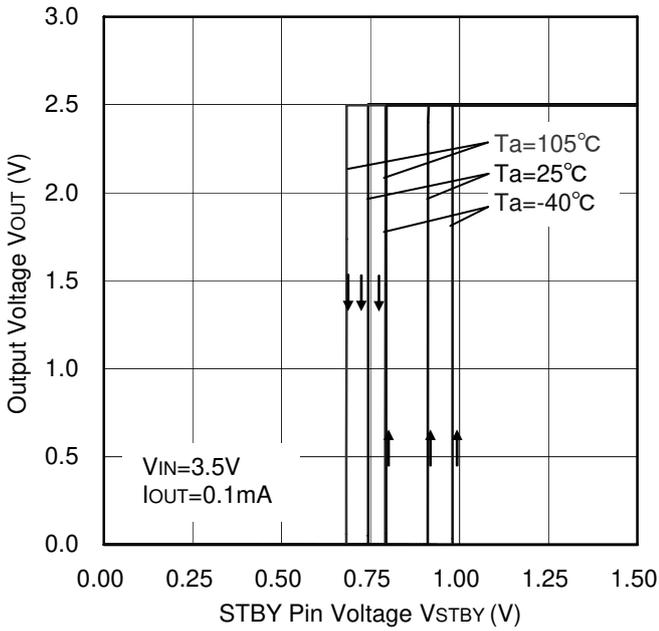
Figure 55. STBY Threshold
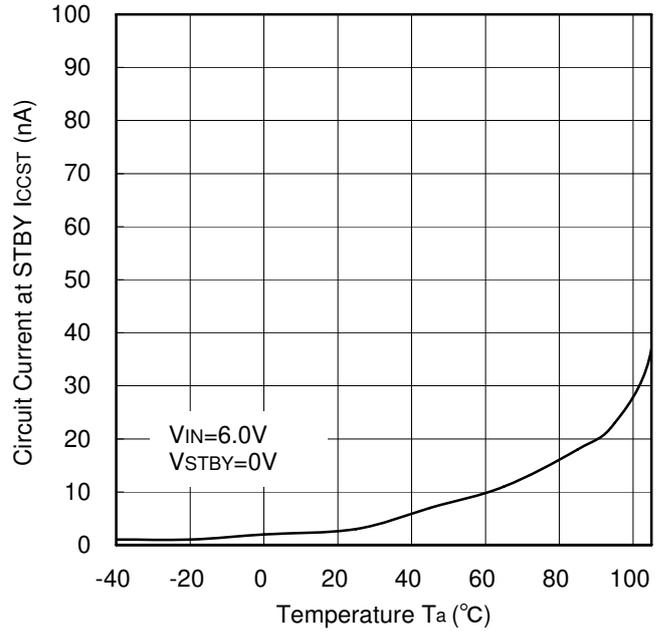
Figure 56. Circuit Current (at STBY) vs. Temperature
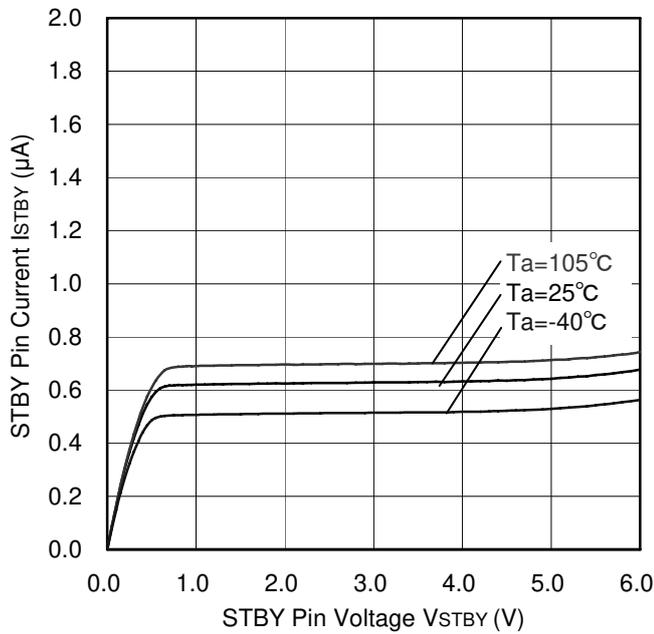
Figure 57. STBY Pin Current vs. STBY Pin Voltage
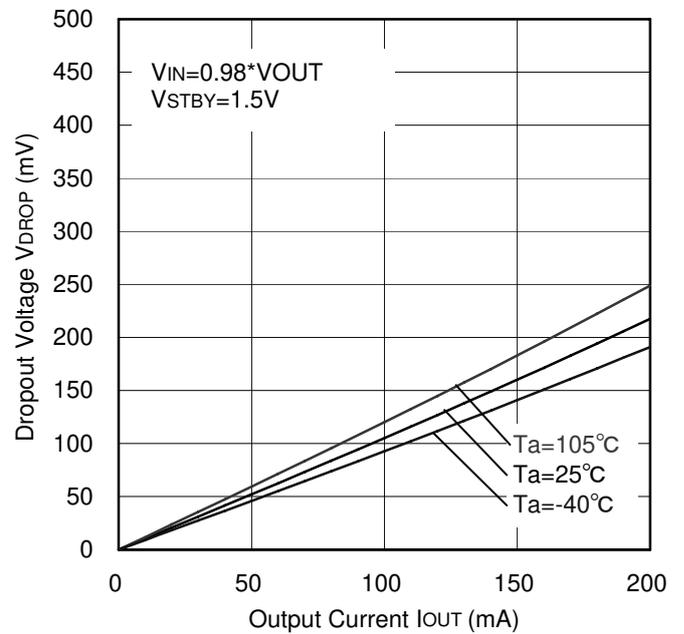
Figure 58. Dropout Voltage vs. Output Current

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●**Reference data BU25SD2MG-M (Unless otherwise specified, Ta=25℃.)**
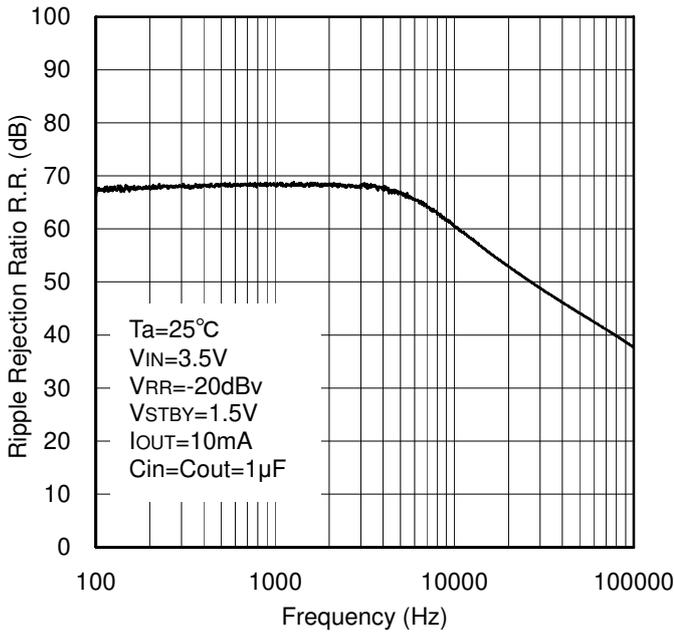
Figure 59. Ripple Rejection Ratio vs. Frequency
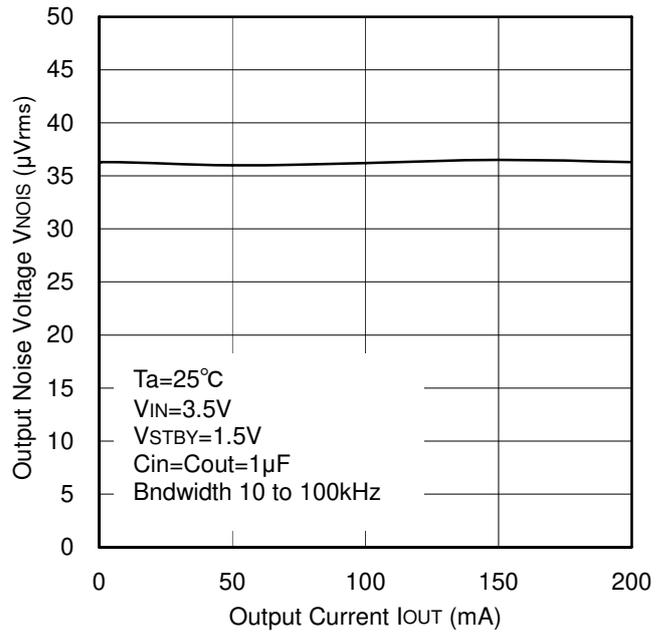
Figure 60. Output Noise Voltage vs. Output Current
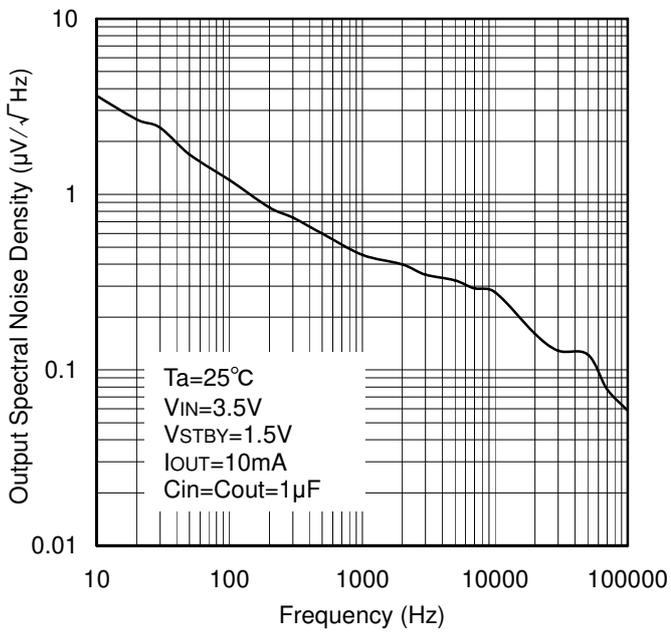
Figure 61.Output Spectral Noise Density vs. Frequency

●**Reference data BU25SD2MG-M (Unless otherwise specified, Ta=25℃.)**
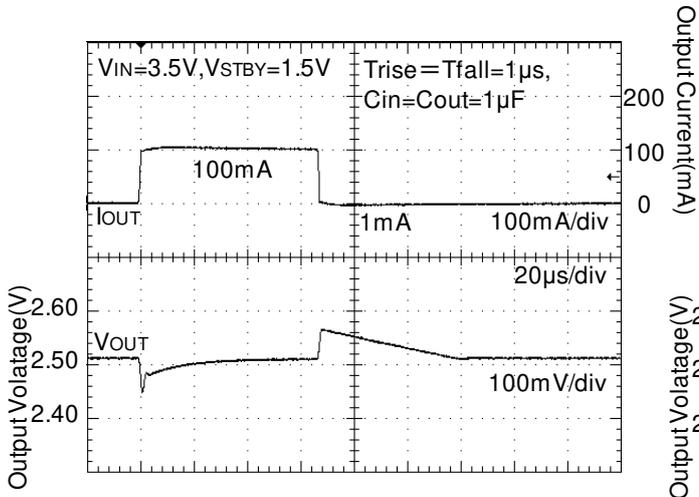
Figure 62. Load Response
(1mA to 100mA)
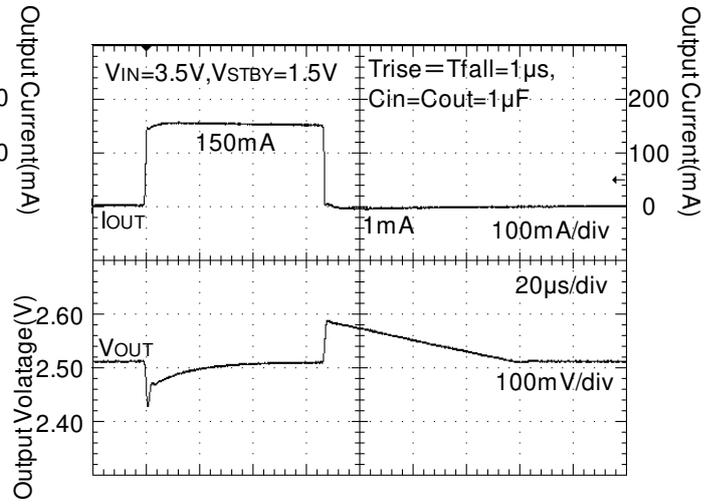
Figure 63. Load Response
(1mA to 150mA)
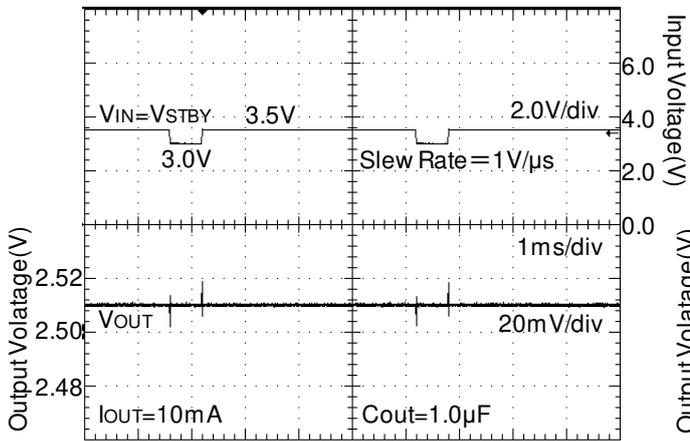

Figure 64. Line Transient Response
(3.0 to 3.5V)
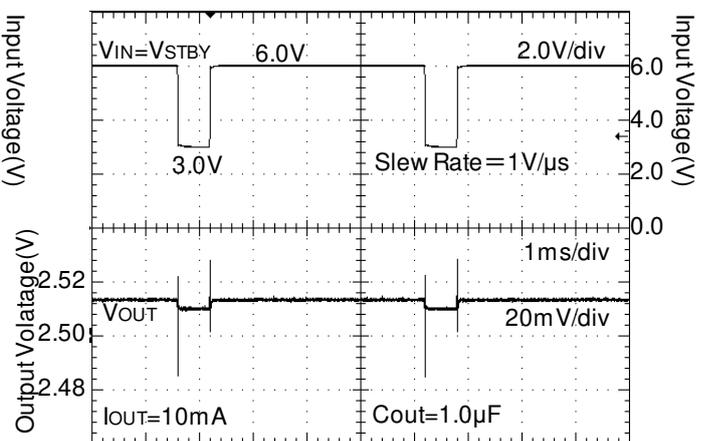
Figure 65. Line Transient Response
(3.0 to 6.0V)

●**Reference data BU25SD2MG-M (Unless otherwise specified, Ta=25℃.)**
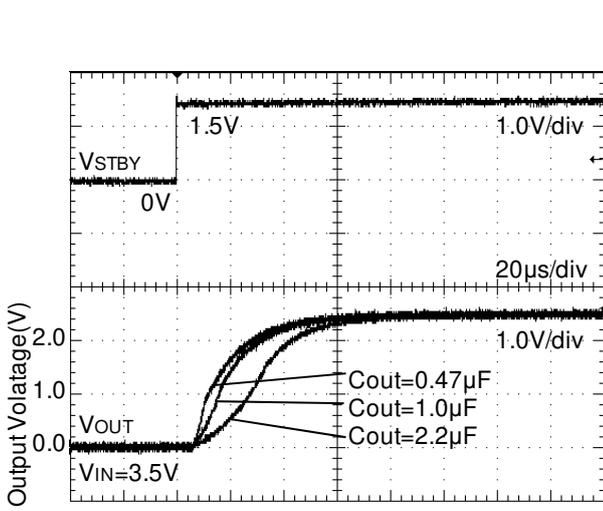
Figure 66. Startup Time
(R_{OUT}=none)
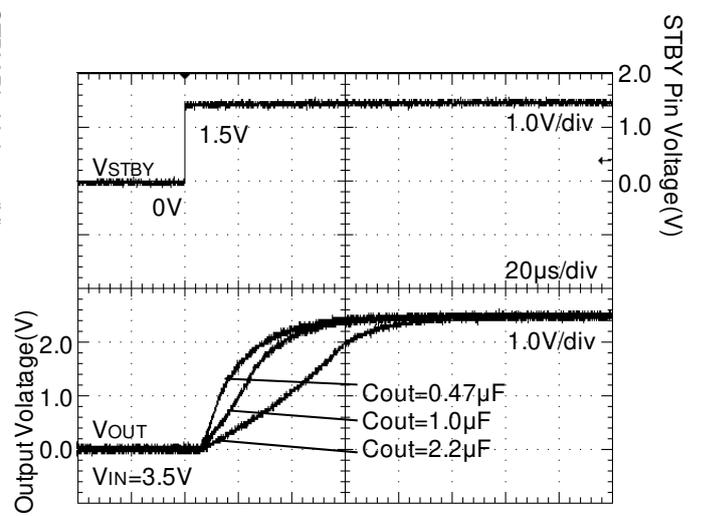
Figure 67. Startup Time
(R_{OUT}=12.5Ω)
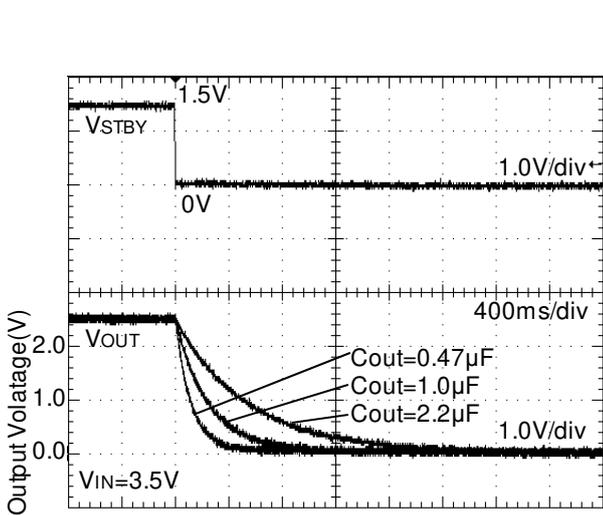
Figure 68. Discharge Time
(R_{OUT}=none)
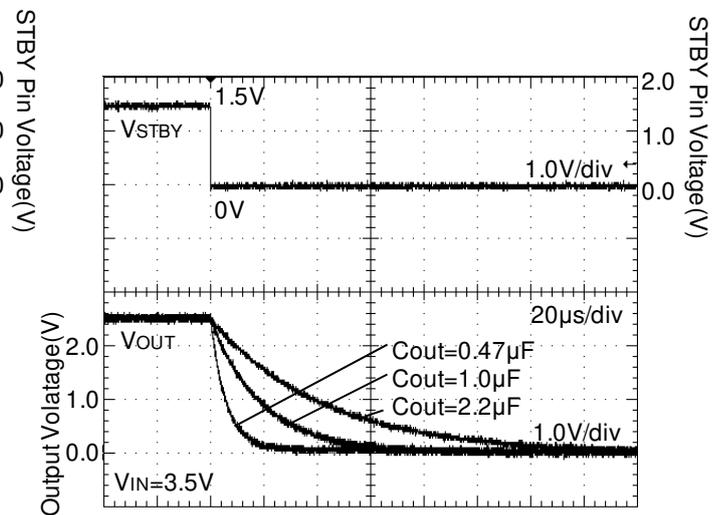
Figure 69. Discharge Time
(R_{OUT}=12.5Ω)

●**Reference data BU33SD2MG-M (Unless otherwise specified, Ta=25℃.)**
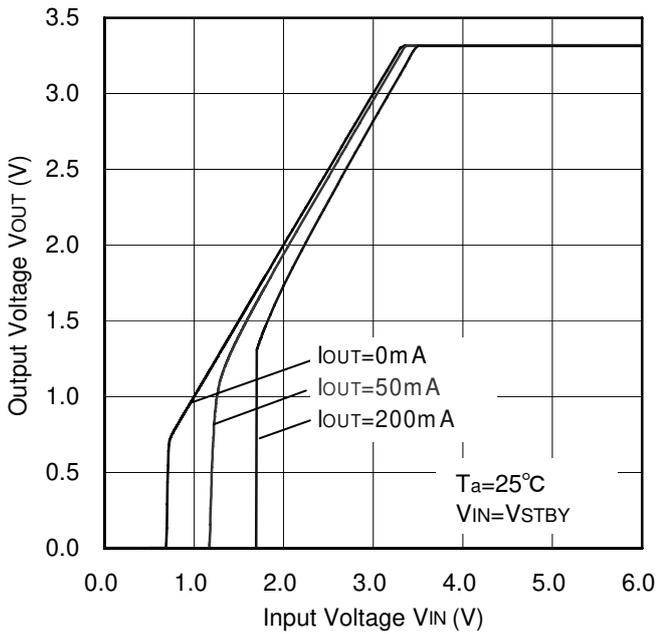
Figure 70. Output Voltage vs. Input Voltage
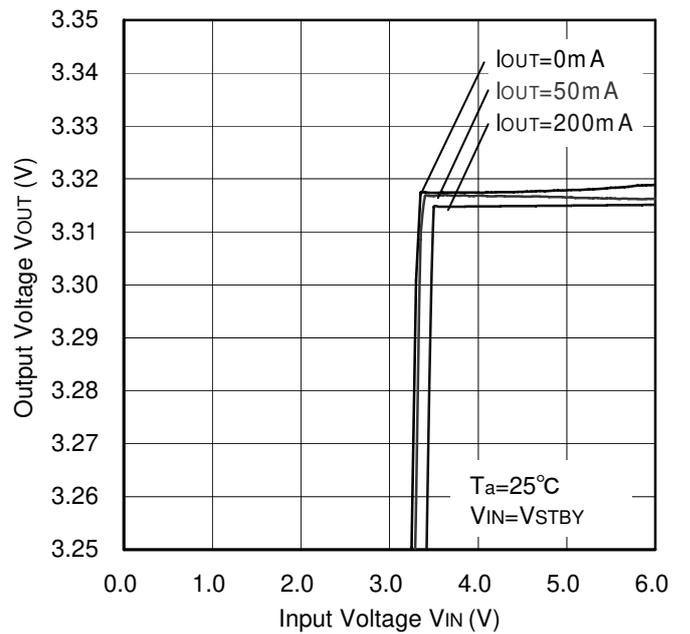

Figure 71. Line Regulation
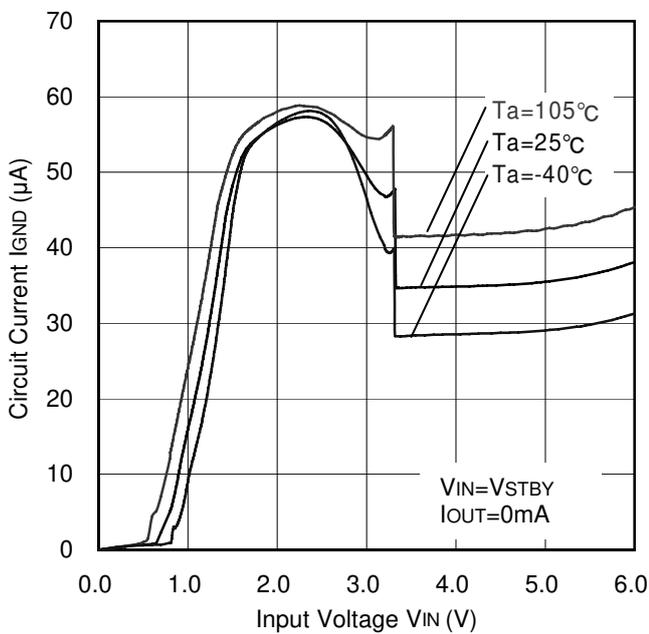
Figure 72. Circuit Current vs. Input Voltage
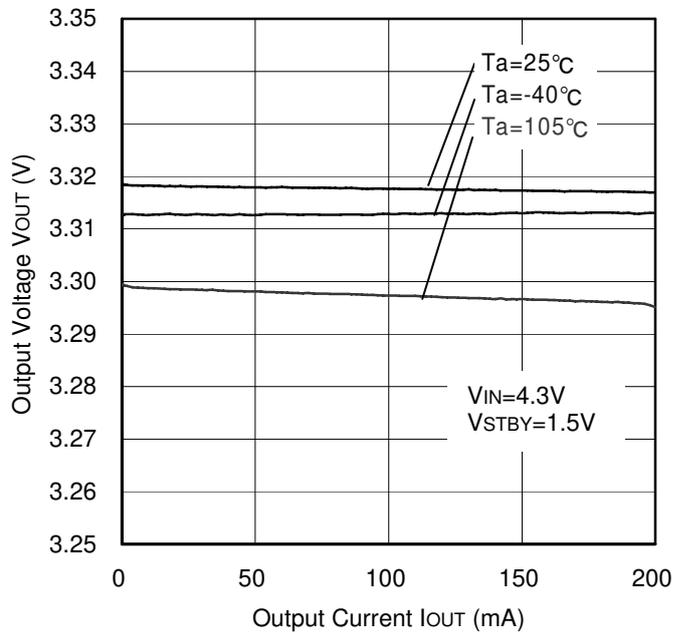
Figure 73. Load Regulation

●**Reference data BU33SD2MG-M (Unless otherwise specified, Ta=25℃.)**
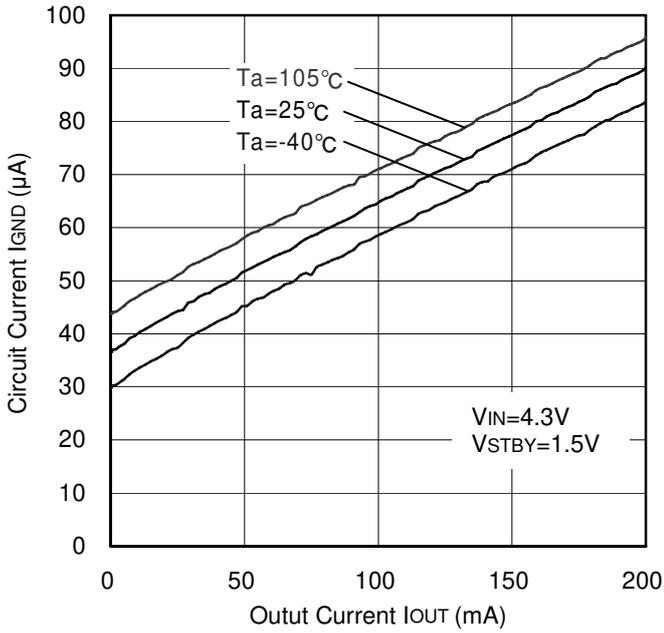

Figure 74. Circuit Current vs. Output Current
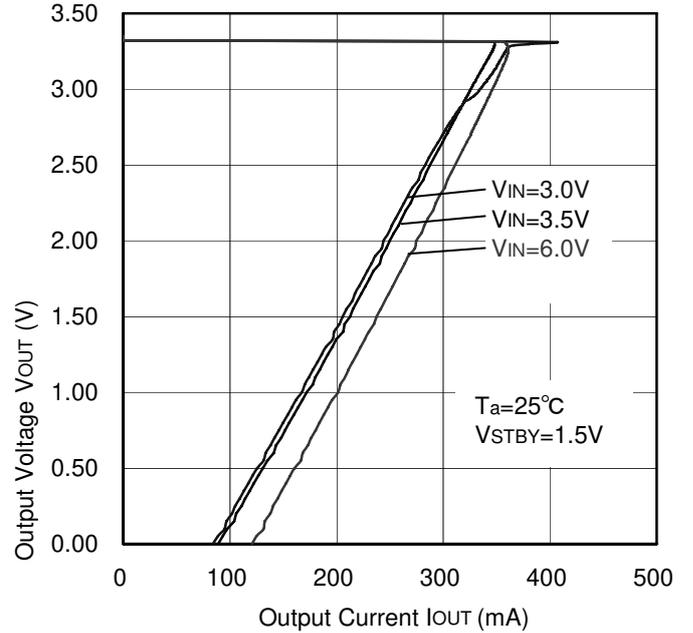

Figure 75. OCP Threshold
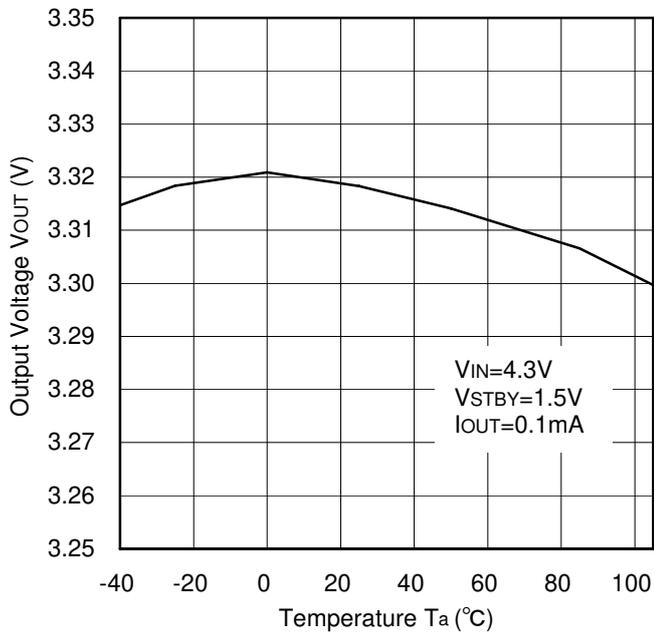
Figure 76. Output Voltage vs. Temperature
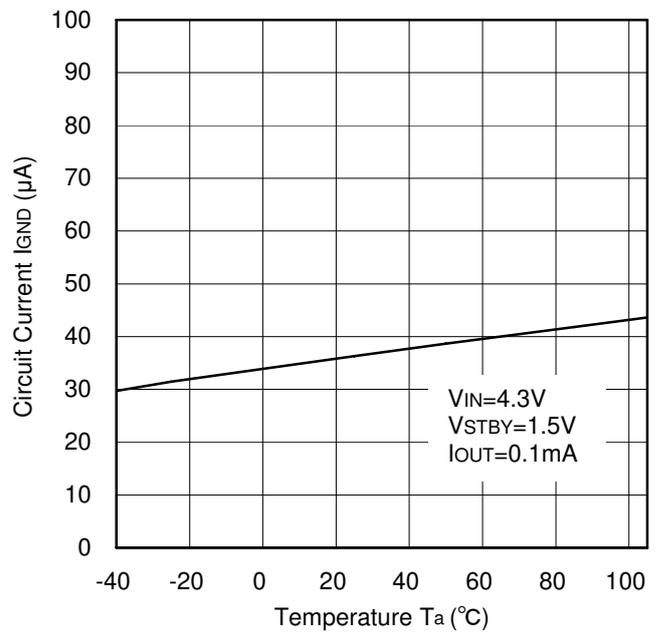
Figure 77. Circuit Current vs. Temperature

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Figure 78. STBY Threshold
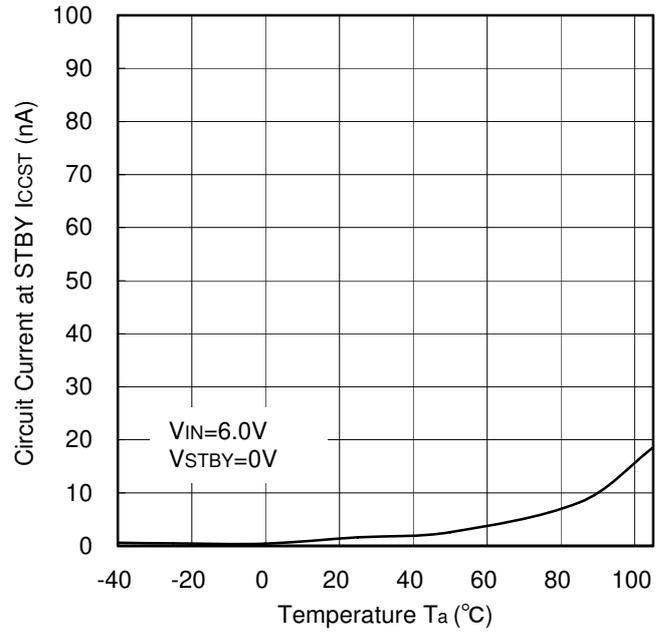
Figure 79. Circuit Current (at STBY) vs. Temperature
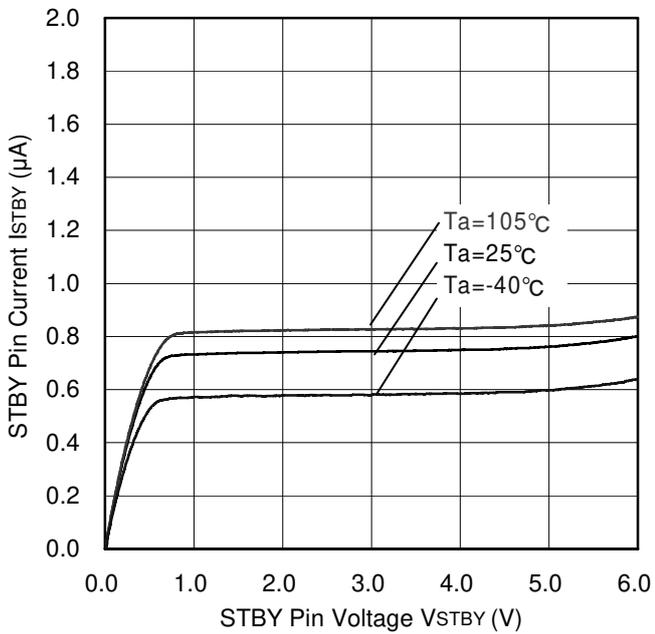

Figure 80. STBY Pin Current vs. STBY Pin Voltage
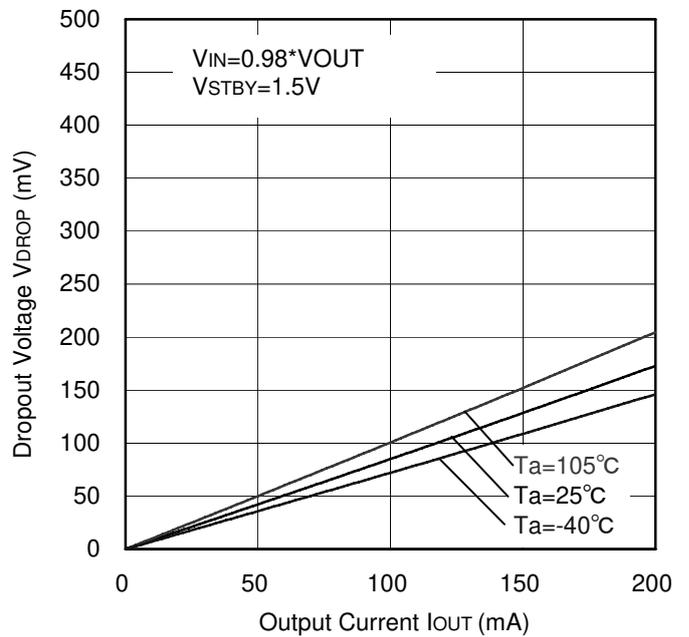
Figure 81. Dropout Voltage vs. Output Current

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