CMOS LDO Regulators for Portable Devices

1ch 200mA CMOS LDO Regulators

BU□□TD3WG Series

No.11020EAT11

●Description

BU□□TD3WG series is high-performance FULL CMOS regulator with 200-mA output, which is mounted on versatile package SSOP5 (2.9 mm × 2.8 mm × 1.25 mm). It has excellent noise characteristics and load responsiveness characteristics despite its low circuit current consumption of 35μA. It is most appropriate for various applications such as power supplies for logic IC, RF, and camera modules.

●Features

1) High-accuracy output voltage of ±1% (±25 mV on Vout<2.5V products)
2) High ripple rejection: 70 dB (Typ., 1 kHz,)
3) Compatible with small ceramic capacitor (CIN=Co=0.47 μF)
4) Low current consumption: 35 μA
5) ON/OFF control of output voltage
6) With built-in over current protection circuit and thermal shutdown circuit
7) With built-in output discharge circuit

●Applications

Battery-powered portable equipment, etc.

●Line up matrix

■200 mA BU□□TD3WG Series

Product Name	10	12	15	18	1J	19	20	21	25	26	Package
BU□□TD3WG	○	○	○	○	○	○	○	○	○	○	SSOP5
	27	28	2J	29	30	31	32	33	34	-	
	○	○	○	○	○	○	○	○	○	-	

Model name: BU□□TD3WG
a

Symbol	Contents							
	Specification of output voltage							
a	□□	Output voltage (V)	□□	Output voltage (V)	□□	Output voltage (V)	□□	Output voltage (V)
	10	1.0 V(Typ.)	19	1.9 V(Typ.)	27	2.7 V(Typ.)	31	3.1 V(Typ.)
	12	1.2 V(Typ.)	20	2.0 V(Typ.)	28	2.8 V(Typ.)	32	3.2 V(Typ.)
	15	1.5 V(Typ.)	21	2.1 V(Typ.)	2J	2.85 V(Typ.)	33	3.3 V(Typ.)
	18	1.8 V(Typ.)	25	2.5 V(Typ.)	29	2.9 V(Typ.)	34	3.4 V(Typ.)
	1J	1.85 V(Typ.)	26	2.6 V(Typ.)	30	3.0 V(Typ.)	-	-

●**Absolute maximum ratings**

Parameter	Symbol	Ratings	Unit
Maximum applied power voltage	VMAX	-0.3 ~ +6.5	V
Power dissipation	Pd	540*1	mW
Maximum junction temperature	TjMAX	+125	℃
Operational temperature range	Topr	-40 ~ +85	℃
Storage temperature range	Tstg	-55 ~ +125	℃

(*1) When PCB (70 mm × 70 mm, thickness 1.6-mm glass epoxy) a standard ROHM board is implemented.
Reduced to 5.6 mW/℃when used at Ta=25℃or higher.

●**Recommended operating range** (Do not exceed Pd.)

Parameter	Symbol	Ratings	Unit
Input power supply voltage	VIN	1.7 ~ 5.5	V
Maximum output current	IMAX	200	mA

●**Recommended operating conditions**

Parameter	Symbol	Ratings			Unit	Conditions
		Min.	Typ.	Max.		
Input capacitor	CIN	0.22(*2)	0.47	—	μF	A ceramic capacitor is recommended.
Output capacitor	CO	0.22(*2)	0.47	—	μF	A ceramic capacitor is recommended.

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

●**Electrical characteristics** (Ta=25℃, VIN=VOUT+1.0V (*3), STBY=VIN, Cin=0.47μF, Co=0.47μF, unless otherwise noted.)

Parameter		Symbol	Limits			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	-	35	60	μA	IOUT=0mA
Operating Current (STBY)		ISTBY	-	-	1.0	μA	STBY=0V
Ripple Rejection Ratio		RR	45	70	-	dB	VRR=-20dBv, fRR=1kHz, IOUT=10mA
Dropout Voltage		VSAT	-	280	540	mV	2.5V≦VOUT≦2.6V (VIN=0.98*VOUT,IOUT=200mA)
			-	260	500	mV	2.7V≦VOUT≦2.85V (VIN=0.98*VOUT,IOUT=200mA)
			-	240	460	mV	2.9V≦VOUT≦3.1V (VIN=0.98*VOUT,IOUT=200mA)
			-	220	420	mV	3.2V≦VOUT≦3.4V (VIN=0.98*VOUT,IOUT=200mA)
Line Regulation		VDL	-	2	20	mV	VIN=VOUT+1.0V to 5.5V(*4), IOUT=10μA
Load Regulation		VDLO	-	10	80	mV	IOUT=0.01mA to 100mA
Over-current Protection (OCP)							
Limit Current		ILMAX	220	400	700	mA	Vo=VOUT*0.95
Short Current		ISHORT	20	70	150	mA	Vo=0V
Standby Block							
Discharge Resistor		RDSC	20	50	80	Ω	VIN=4.0V, STBY=0V, VOUT=4.0V
STBY Pin Pull-down Current		ISTB	0.1	0.6	2.0	μA	STBY=1.5V
STBY Control Voltage	ON	VSTBH	1.2	-	5.5	V	
	OFF	VSTBL	-0.3	-	0.3	V	

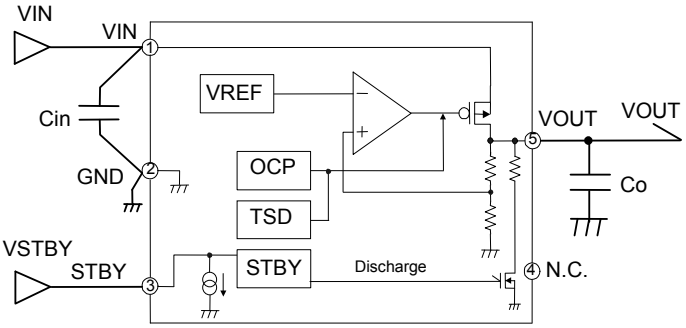
* This product does not have radiation-proof design.
(*3) VIN=2.5V for VOUT≦1.5V
(*4) VIN=2.5V to 5.5V for VOUT≦1.5V

●**Electrical characteristics of each Output Voltage**
(Ta=25℃, STBY=VIN, Cin=0.47μF, Co=0.47μF, unless otherwise noted.)

Output Voltage	Parameter	Min.	Typ.	Max.	Unit	Conditions
1.0, 1.2V	Maximum output current	80	160	-	mA	VIN=1.7V
		200	-	-		VIN=2.1V
1.5V		60	120	-		VIN=1.8V
		200	-	-		VIN=2.2V
1.8V, 1.85V, 1.9V, 2.0V, 2.1V		200	-	-		VIN=VOUT+0.6V

●Block diagram, recommended circuit diagram, and pin configuration diagram

BU□□TD3WG



Recommended ceramic capacitor for Cin & Co
Murata Manufacturing Co., Ltd.
GRM188B11A474KA61D

Fig.1 Recommended circuit diagram

PIN No.	Symbol	Function
1	VIN	Power input
2	GND	Grounding
3	STBY	ON/OFF control of output voltage (High: ON, Low: OFF)
4	N.C.	NO CONNECT
5	VOUT	Voltage output

●Input / Output terminal equivalent circuit schematic

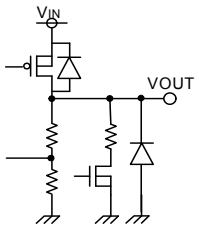
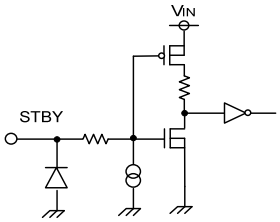
5pin (VOUT)	2pin (GND)	3pin (STBY)	1pin (VIN)
			

Fig.2 Input / Output equivalent circuit

●About input/output capacitor

It is recommended to place a capacitor as close as possible to the pins between the input terminal and GND or between the output terminal and GND.

The capacitor between the input terminal and GND becomes valid when source impedance increases or when wiring is long. The larger the capacity of the output capacitor between the output terminal and GND is, the better the stability and characteristics in output load fluctuation become. However, please check the status of actual implementation. Ceramic capacitors generally have variation, temperature characteristics, and direct current bias characteristics and the capacity value also decreases with time depending on the usage conditions. It is recommended to select a ceramic capacitor upon inquiring about detailed data of the related manufacturer.

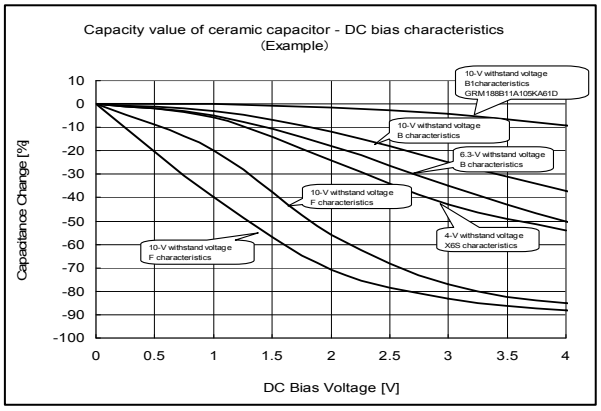


Fig.3 Capacity – bias characteristics

●About the equivalent series resistance (ESR) of a ceramic capacitor

Capacitors generally have ESR (equivalent series resistance) and it operates stably in the ESR-IOUT area shown on the right. Since ceramic capacitors, tantalum capacitors, electrolytic capacitors, etc. generally have different ESR, please check the ESR of the capacitor to be used and use it within the stability area range shown in the right graph for evaluation of the actual application.

Cout=0.47μF Cin=0.47μF Temp=+25℃

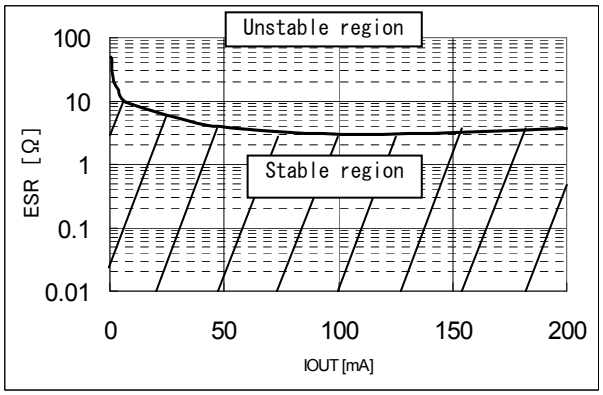


Fig.4 Stability area characteristics (Example)

●Reference data BU12TD3WG (Ta=25℃ unless otherwise specified.)

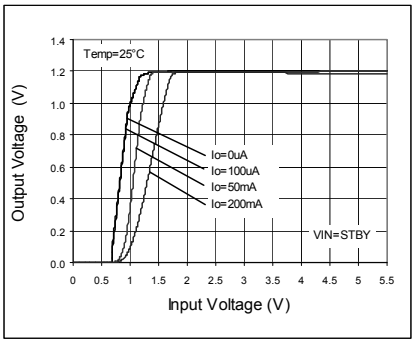


Fig.5. Output Voltage

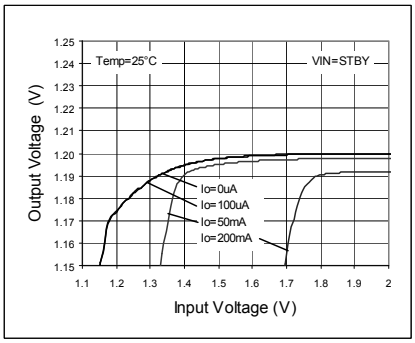


Fig.6. Line Regulation

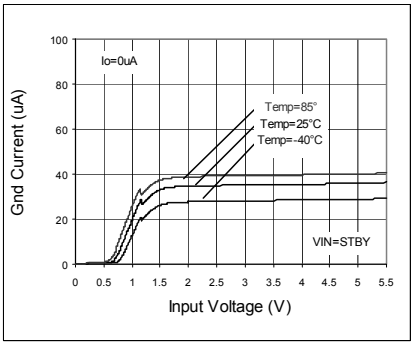


Fig.7. Circuit Current IGND

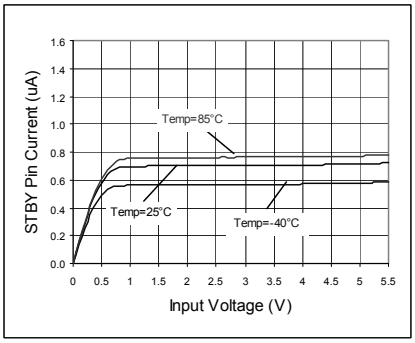


Fig.8. VSTBY - ISTBY

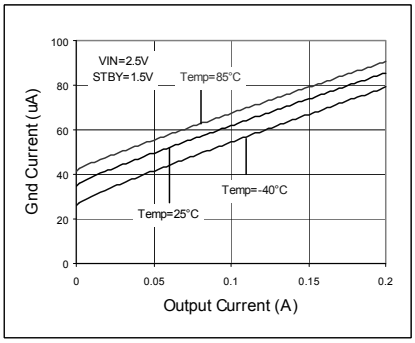


Fig.9. IOUT - IGND

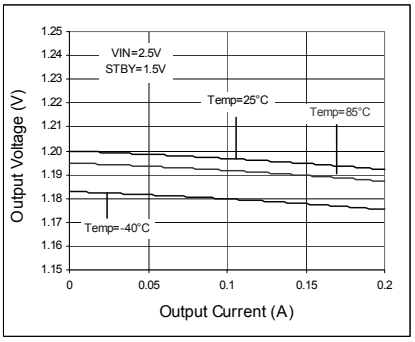


Fig.10. Load Regulation

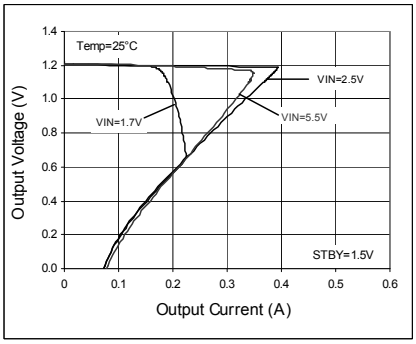


Fig.11. OCP Threshold

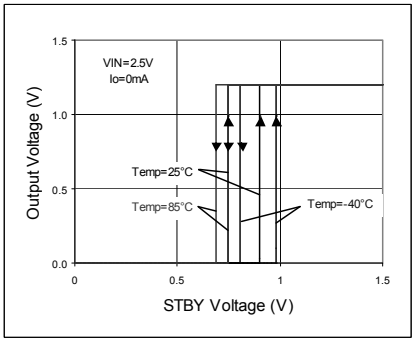


Fig.12. STBY Threshold

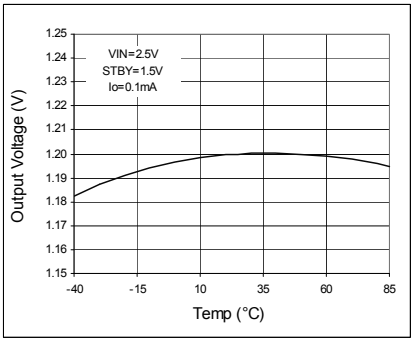


Fig.13. VOUT - Temp

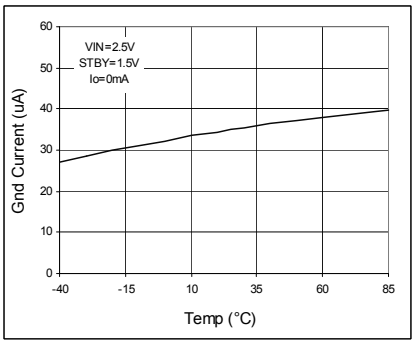


Fig.14. IGND vs Temp

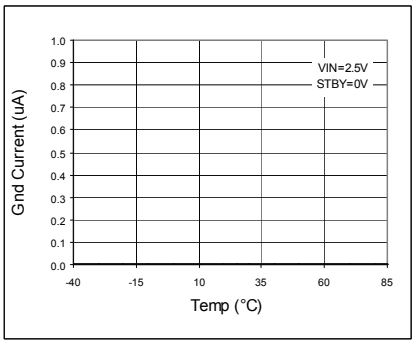


Fig.15. IGND - Temp (STBY)

●Reference data BU12TD3WG (Ta=25℃ unless otherwise specified.)

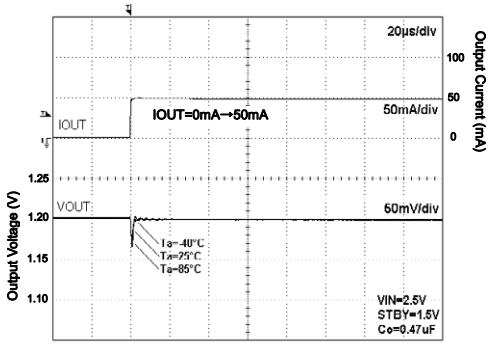


Fig.16. Load Response

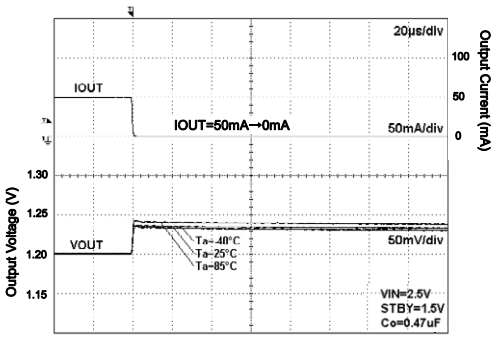


Fig.17. Load Response

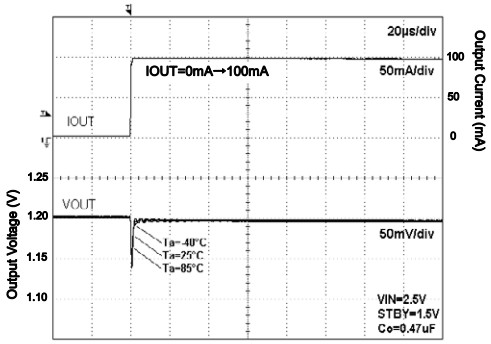


Fig.18. Load Response

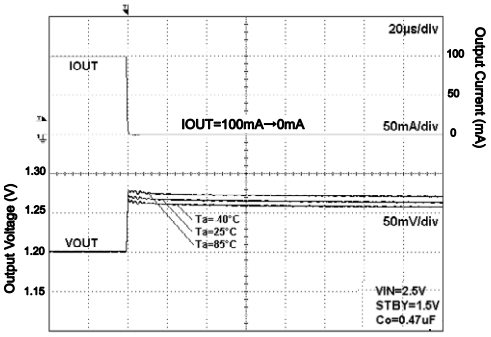


Fig.19. Load Response

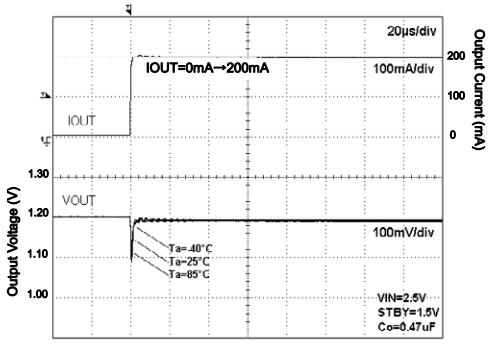


Fig.20. Load Response

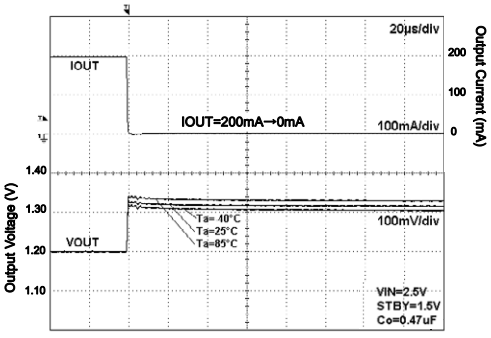


Fig.21. Load Response

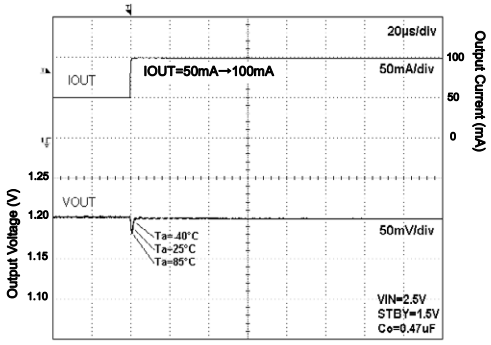


Fig.22. Load Response

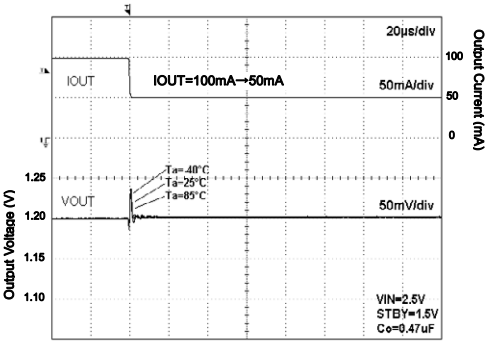


Fig.23. Load Response

●Reference data BU12TD3WG (Ta=25℃ unless otherwise specified.)

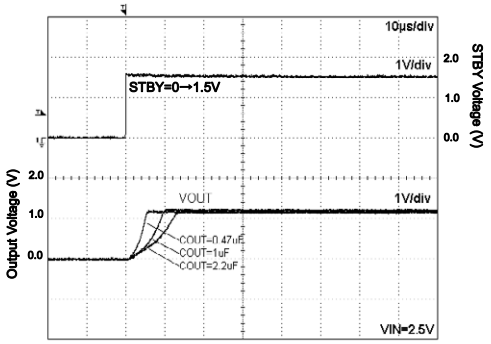


Fig.24. Start Up Time
Iout=0mA

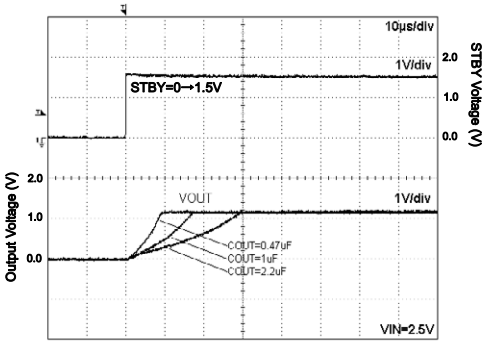


Fig.25. Start Up Time
Iout=200mA

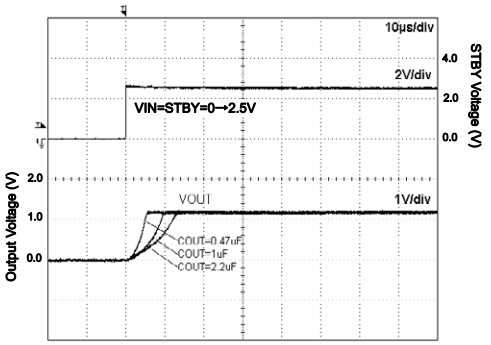


Fig.26. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

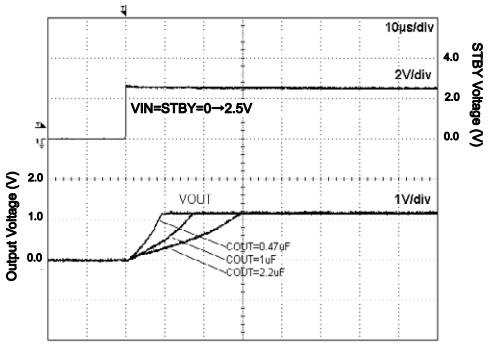


Fig.27. Start Up Time
(VIN=STBY) Iout=200mA

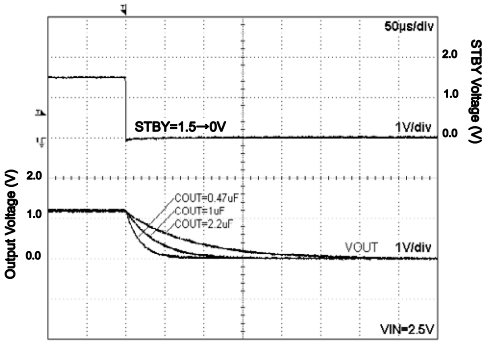


Fig.28. Discharge Time

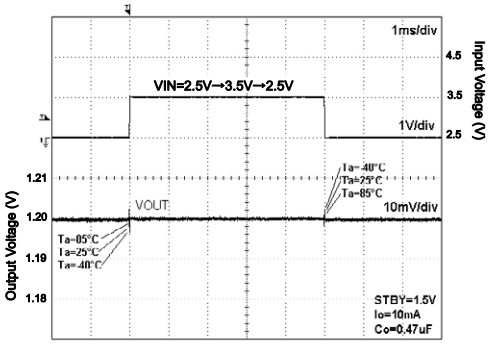


Fig.29. VIN Response

●Reference data BU15TD3WG (Ta=25℃ unless otherwise specified.)

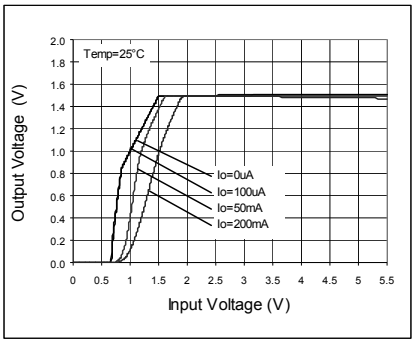


Fig.30. Output Voltage

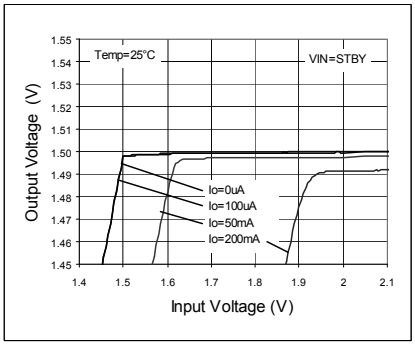


Fig.31. Line Regulation

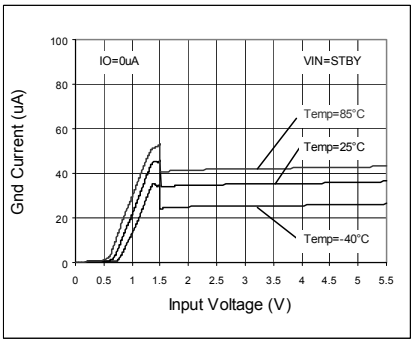


Fig.32. Circuit Current IGND

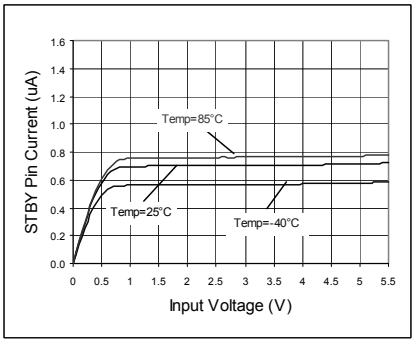


Fig.33. VSTBY - ISTBY

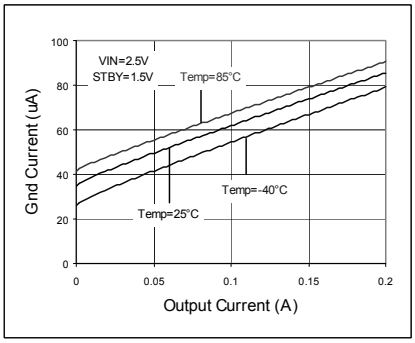


Fig.34. IOUT - IGND

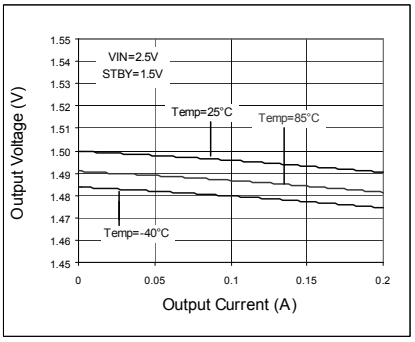


Fig.35. Load Regulation

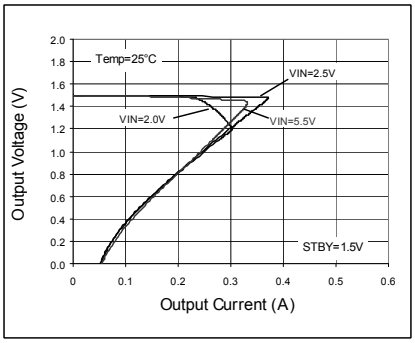


Fig.36. OCP Threshold

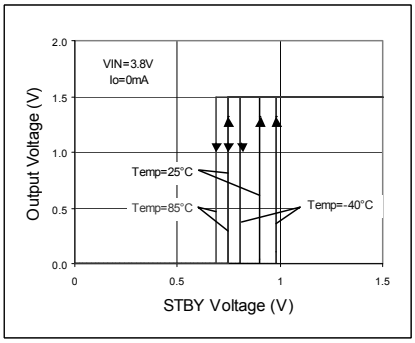


Fig.37. STBY Threshold

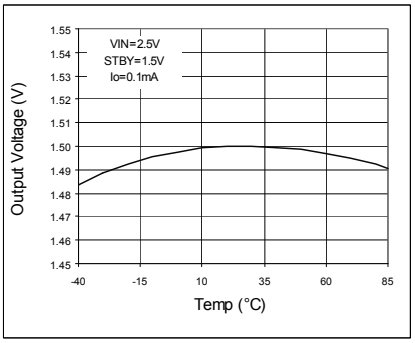


Fig.38. VOUT - Temp

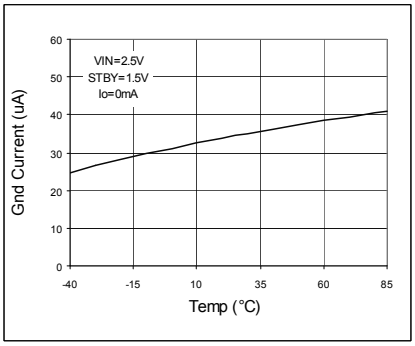


Fig.39. IGND vs Temp

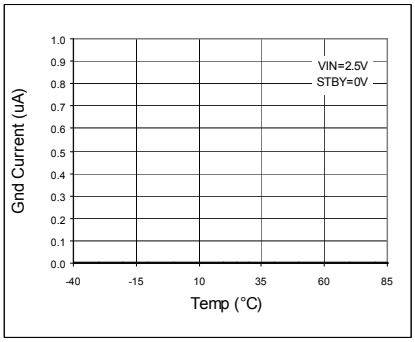


Fig.40. IGND vs Temp (STBY)

●Reference data BU15TD3WG (Ta=25℃ unless otherwise specified.)

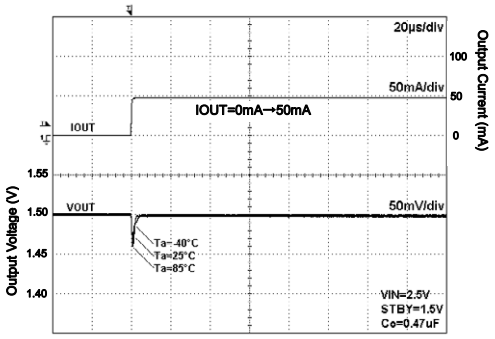


Fig.41. Load Response

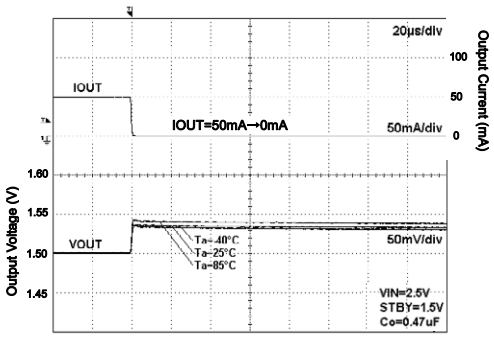


Fig.42. Load Response

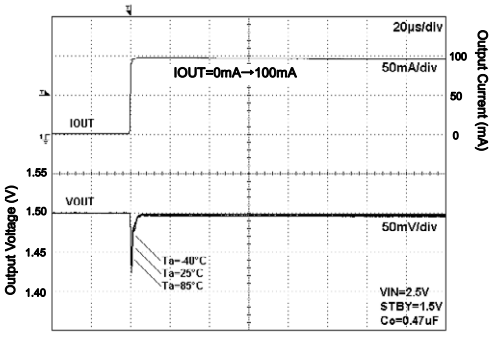


Fig.43. Load Response

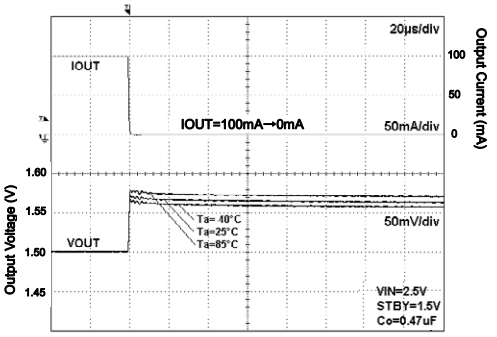


Fig.44. Load Response

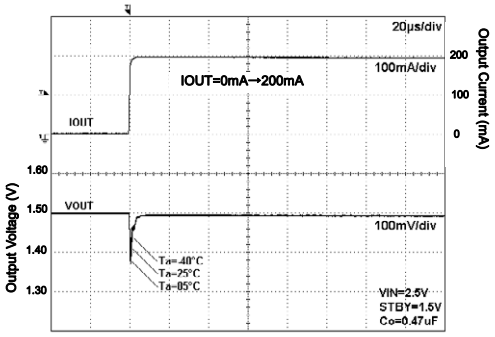


Fig.45. Load Response

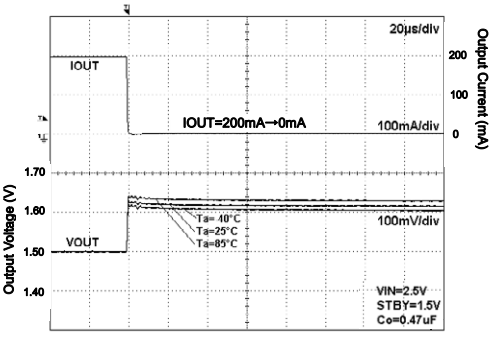


Fig.46. Load Response

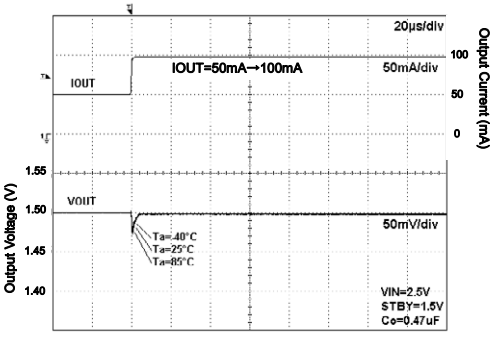


Fig.47. Load Response

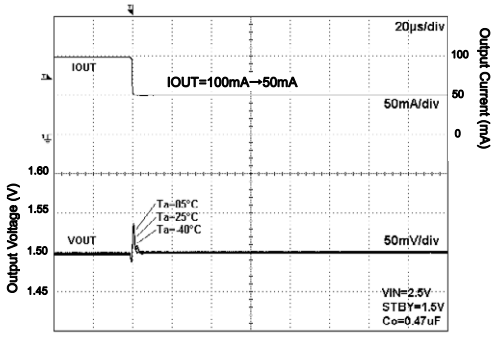


Fig.48. Load Response

●Reference data BU15TD3WG (Ta=25℃ unless otherwise specified.)

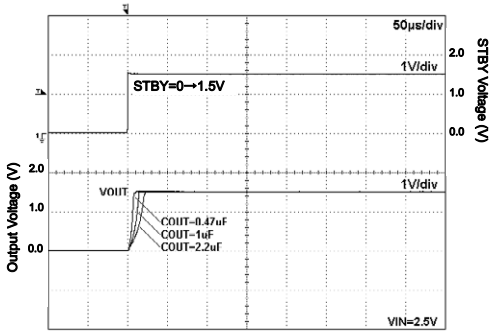


Fig.49. Start Up Time
Iout=0mA

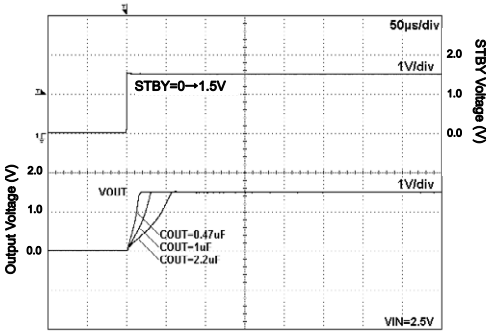


Fig.50. Start Up Time
Iout=200mA

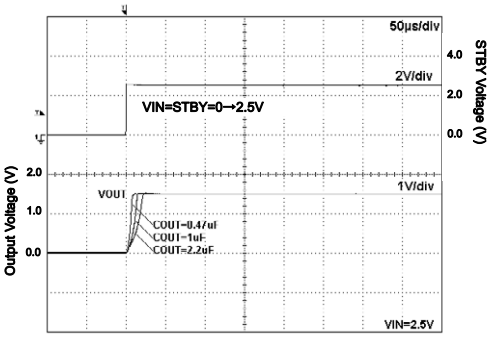


Fig.51. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

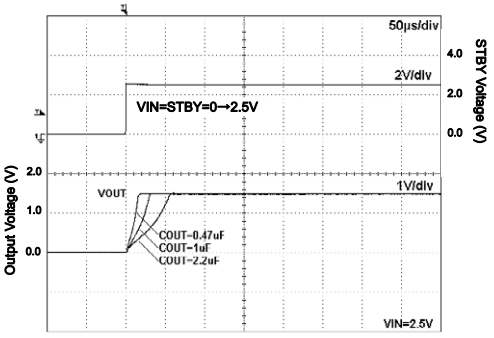


Fig.52. Start Up Time
(VIN=STBY) Iout=200mA

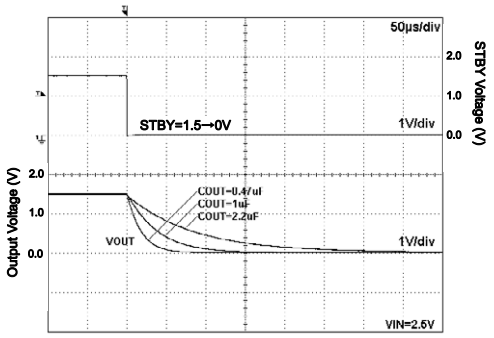


Fig.53. Discharge Time

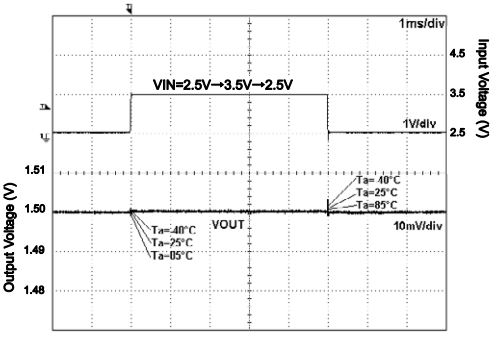


Fig.54. VIN Response

●Reference data BU18TD3WG (Ta=25℃ unless otherwise specified.)

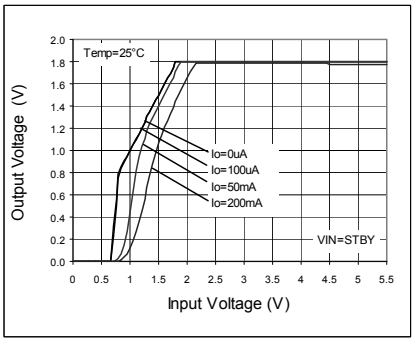


Fig.55. Output Voltage

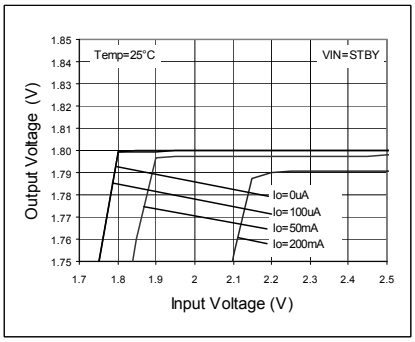


Fig.56. Line Regulation

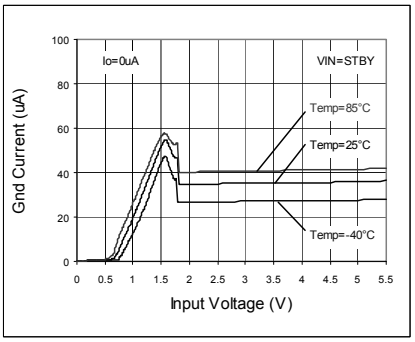


Fig.57. Circuit Current IGND

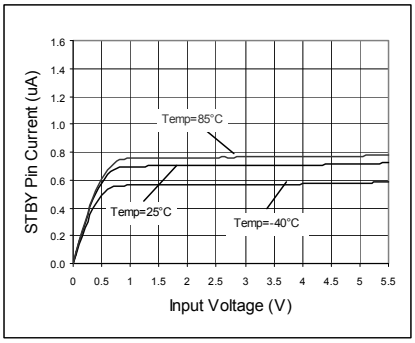


Fig.58. VSTBY - ISTBY

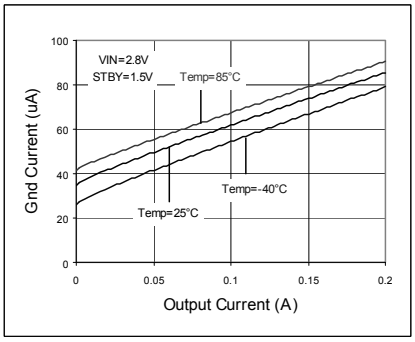


Fig.59. IOUT - IGND

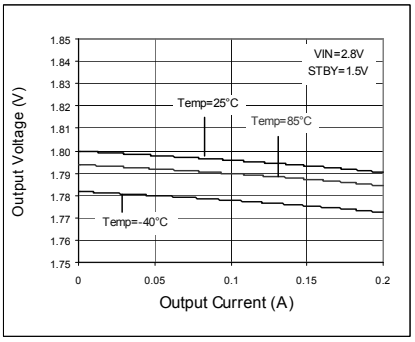


Fig.60. Load Regulation

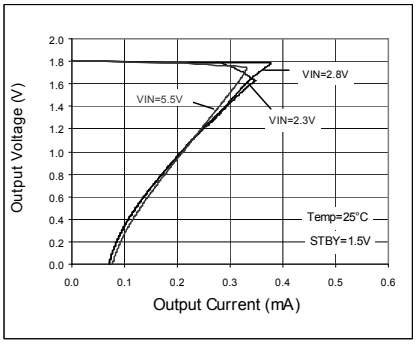


Fig.61. OCP Threshold

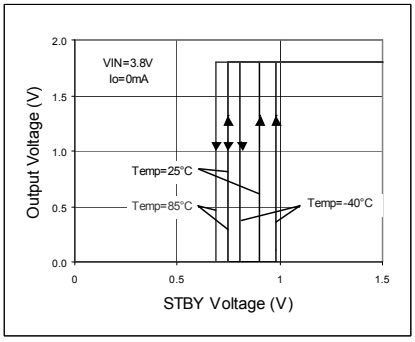


Fig.62. STBY Threshold

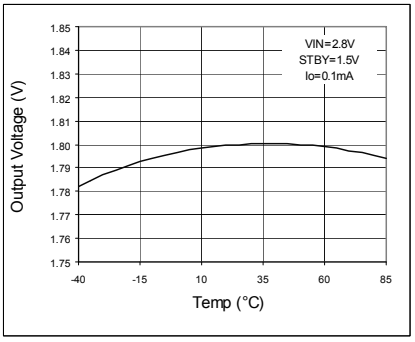


Fig.63. VOUT - Temp

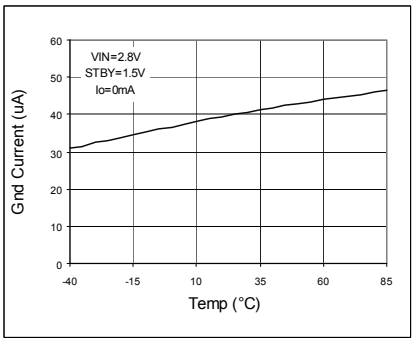


Fig.64. IGND - Temp

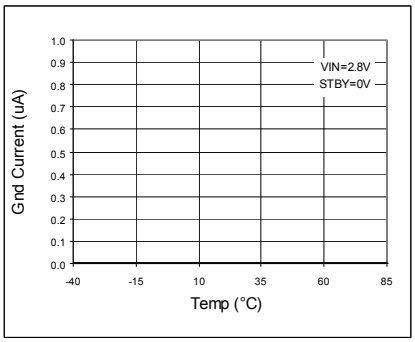


Fig.65. IGND - Temp (STBY)

●Reference data BU18TD3WG (Ta=25℃ unless otherwise specified.)

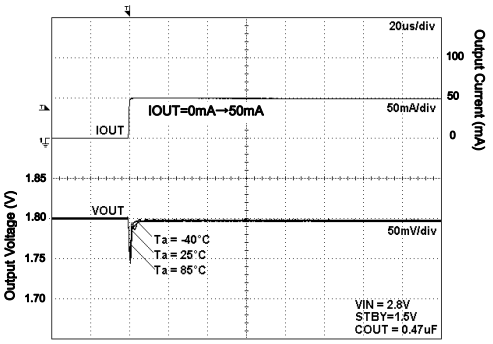


Fig.66. Load Response

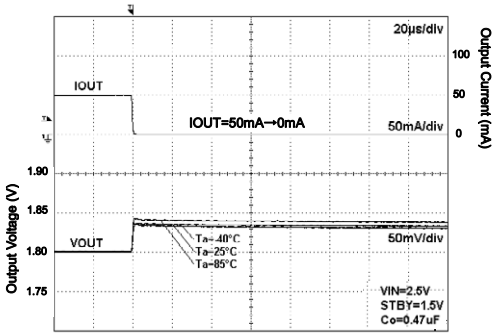


Fig.67. Load Response

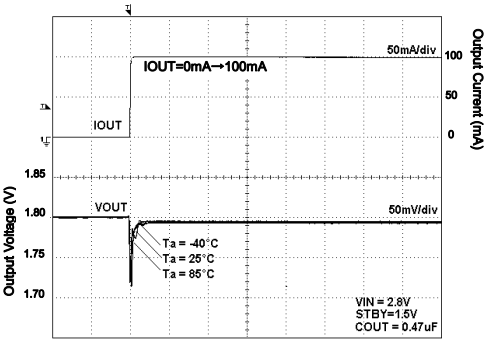


Fig.68. Load Response

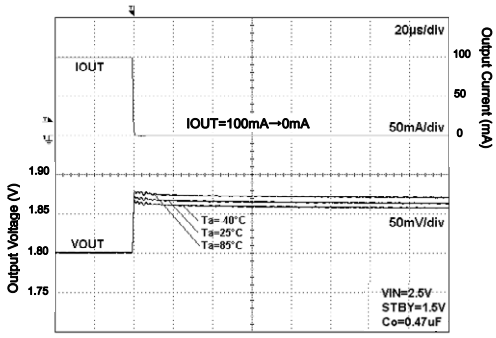


Fig.69. Load Response

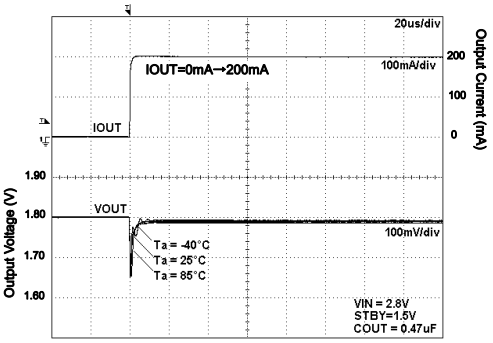


Fig.70. Load Response

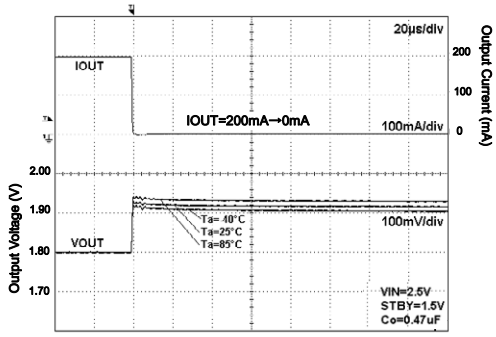


Fig.71. Load Response

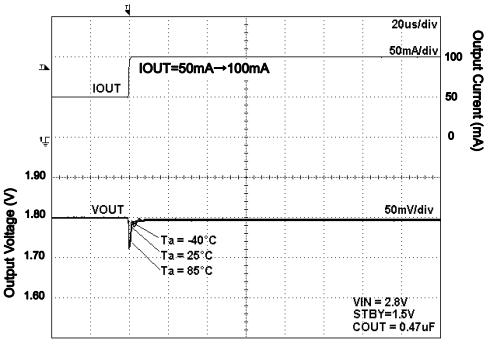


Fig.72. Load Response

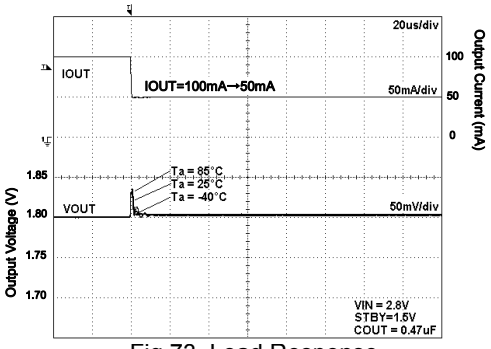


Fig.73. Load Response

●Reference data BU18TD3WG (Ta=25℃ unless otherwise specified.)

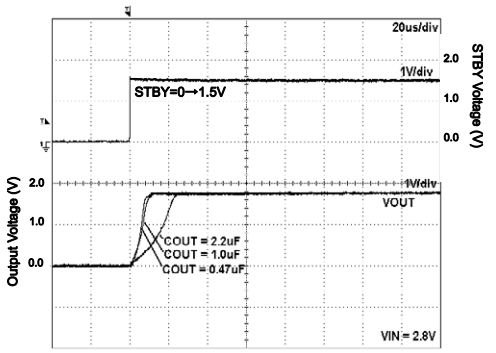


Fig.74. Start Up Time
Iout=0mA

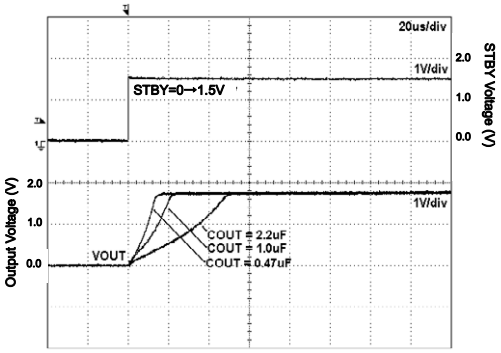


Fig.75. Start Up Time
Iout=200mA

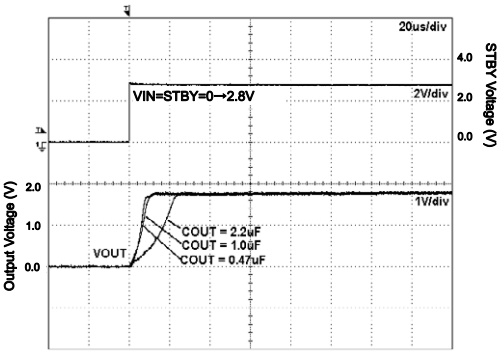


Fig.76. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

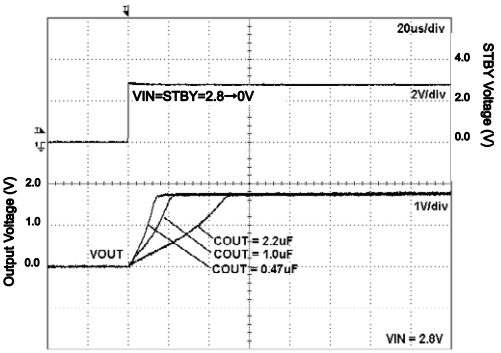


Fig.77. Start Up Time
(VIN=STBY) Iout=200mA

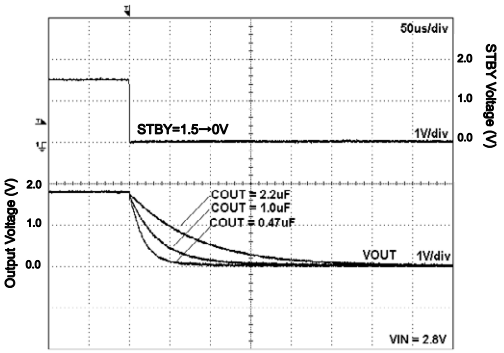


Fig.78. Discharge Time

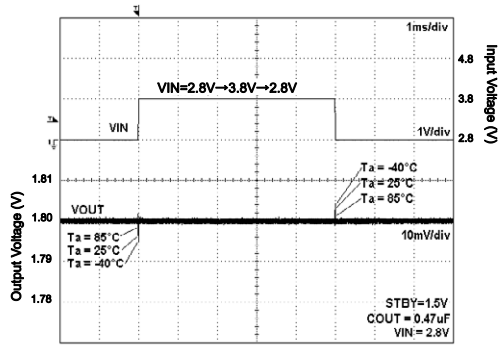


Fig.79. VIN Response

●Reference data BU19TD3WG (Ta=25℃ unless otherwise specified.)

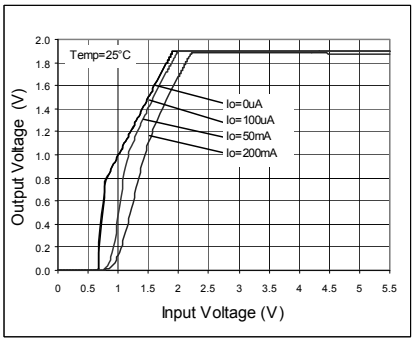


Fig.80. Output Voltage

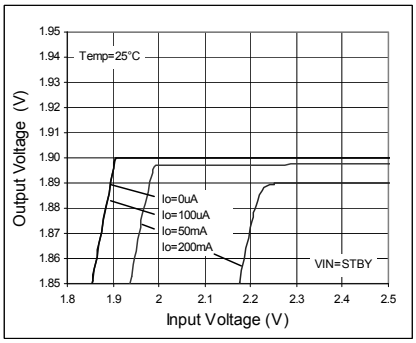


Fig.81. Line Regulation

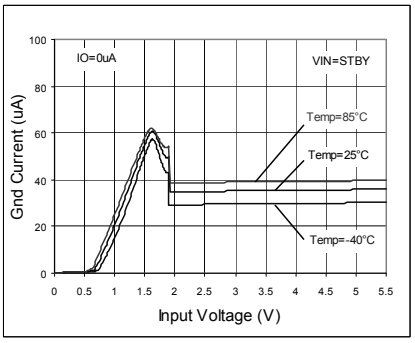


Fig.82. Circuit Current IGND

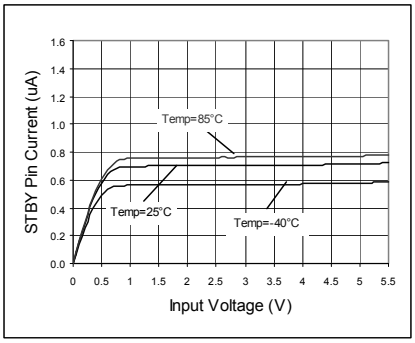


Fig.83. VSTBY - ISTBY

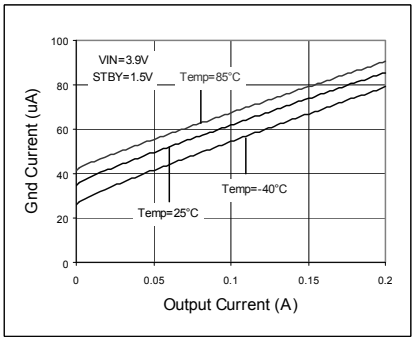


Fig.84. IOUT - IGND

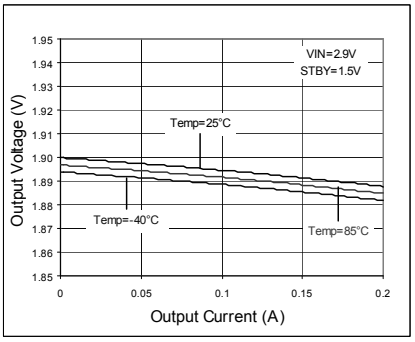


Fig.85. Load Regulation

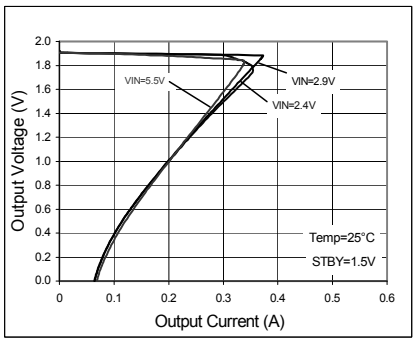


Fig.86. OCP Threshold

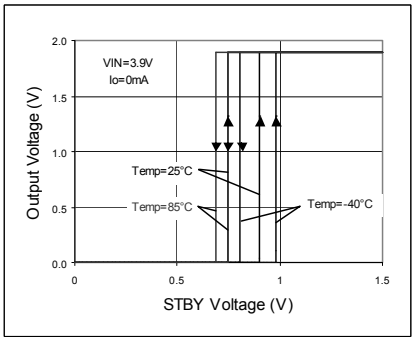


Fig.87. STBY Threshold

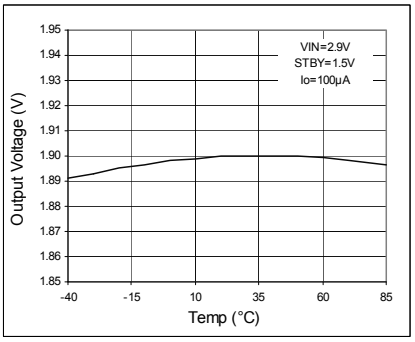


Fig.88. VOUT - Temp

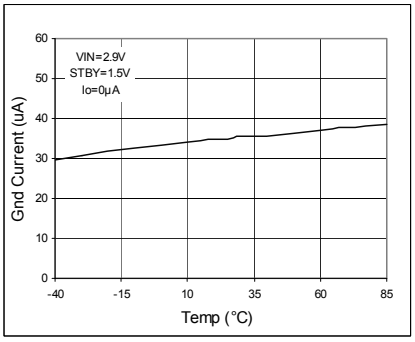


Fig.89. IGND - Temp

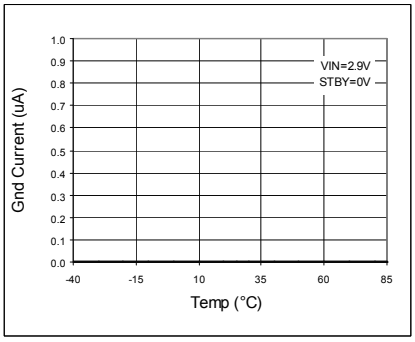


Fig.90. IGND - Temp (STBY)

●Reference data BU19TD3WG (Ta=25℃ unless otherwise specified.)

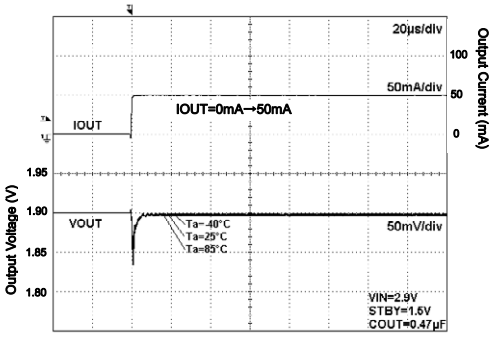


Fig.91. Load Response

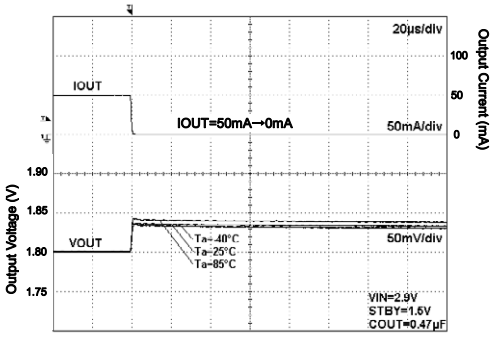


Fig.92. Load Response

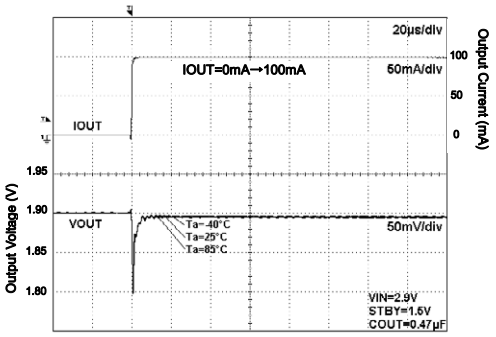


Fig.93. Load Response

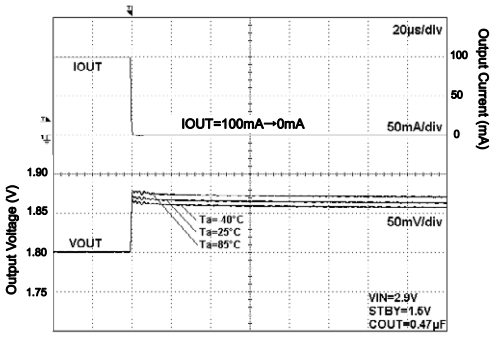


Fig.94. Load Response

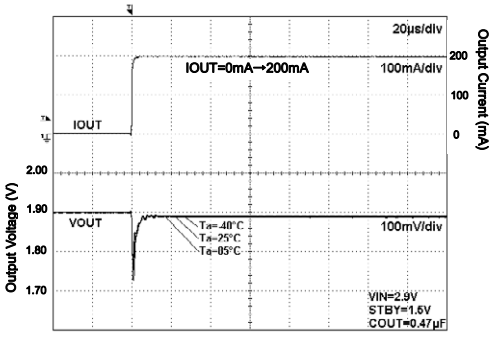


Fig.95. Load Response

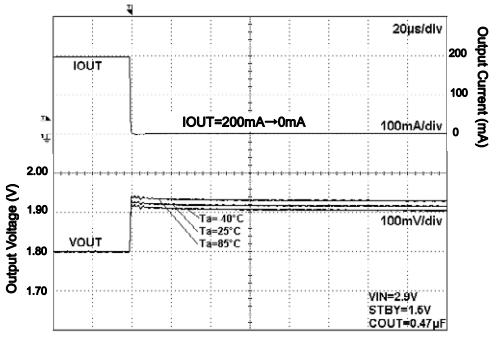


Fig.96. Load Response

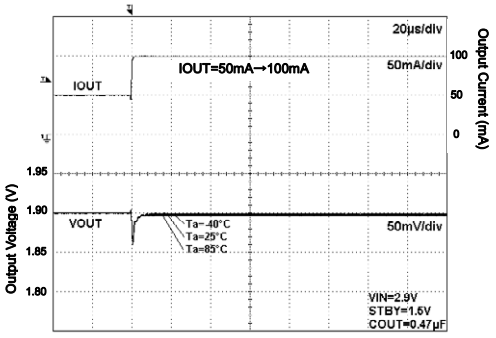


Fig.97. Load Response

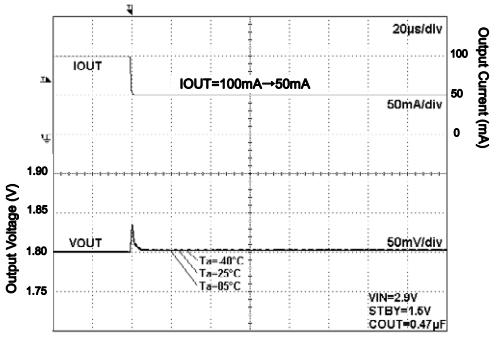


Fig.98. Load Response

●Reference data BU19TD3WG (Ta=25℃ unless otherwise specified.)

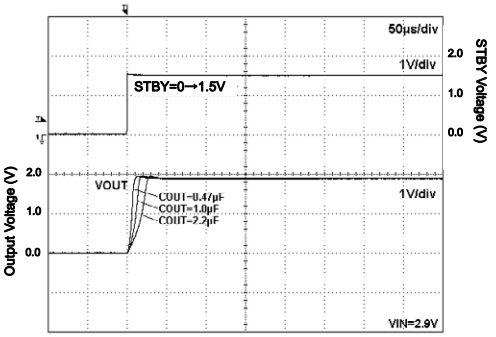


Fig.99. Start Up Time
Iout=0mA

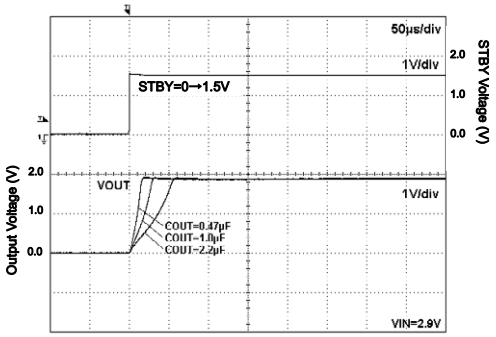


Fig.100. Start Up Time
Iout=200mA

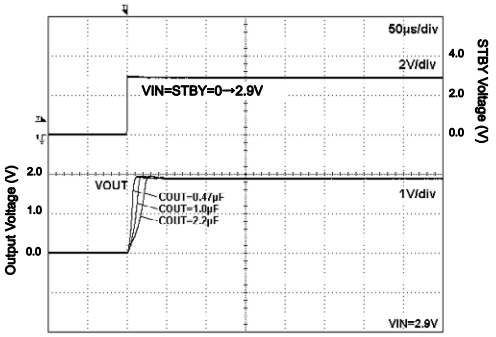


Fig.101. Start Up Time
(VIN=STBY) Iout=0mA

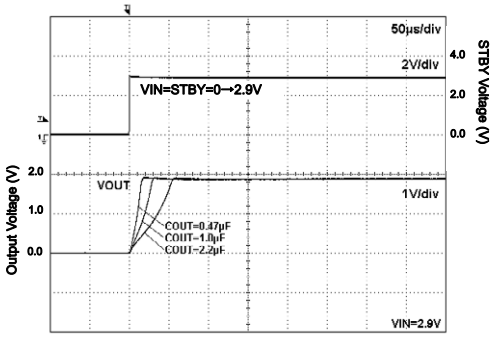


Fig.102. Start Up Time
(VIN=STBY) Iout=200mA

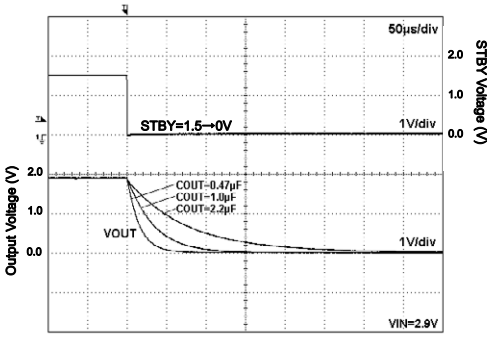


Fig.103. Discharge Time

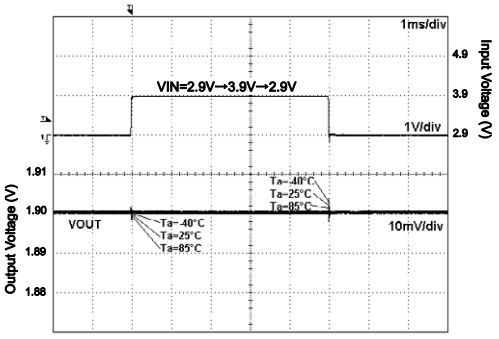


Fig.104. VIN Response

●Reference data BU25TD3WG (Ta=25℃ unless otherwise specified.)

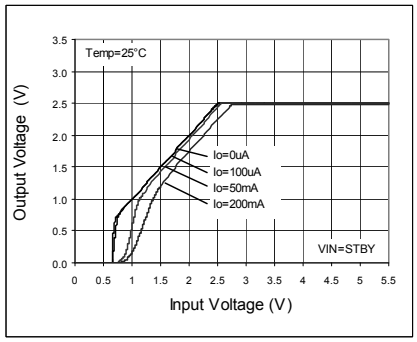


Fig.105. Output Voltage

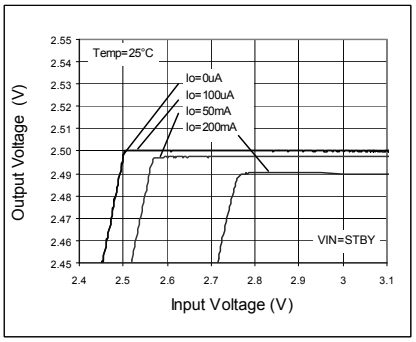


Fig.106. Line Regulation

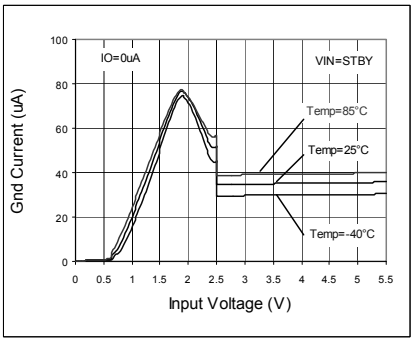


Fig.107. Circuit Current IGND

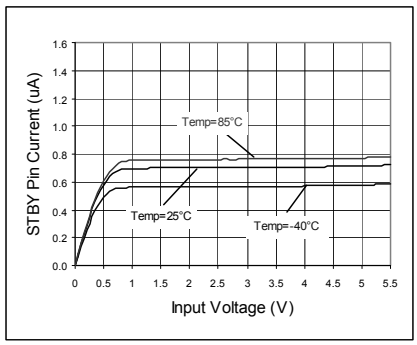


Fig.108. VSTBY - ISTBY

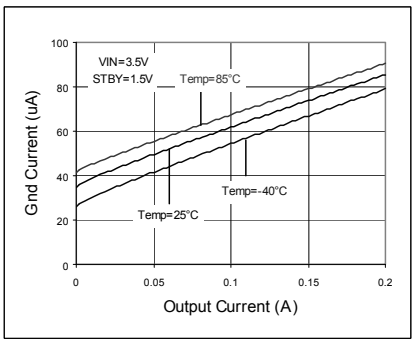


Fig.109. IOUT - IGND

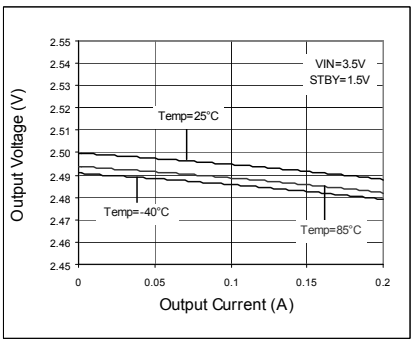


Fig.110. Load Regulation

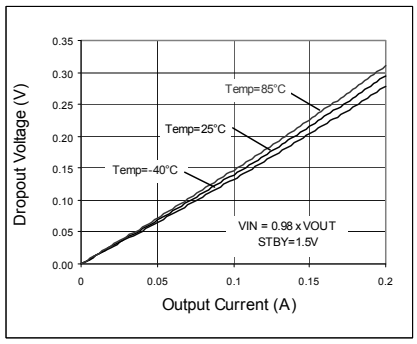


Fig.111. Dropout Voltage

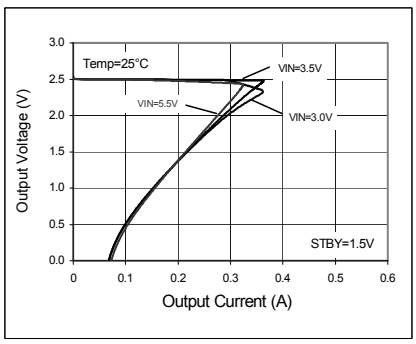


Fig.112. OCP Threshold

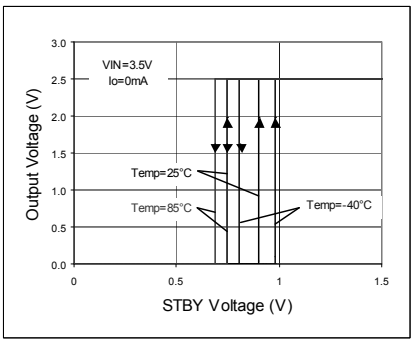


Fig.113. STBY Threshold

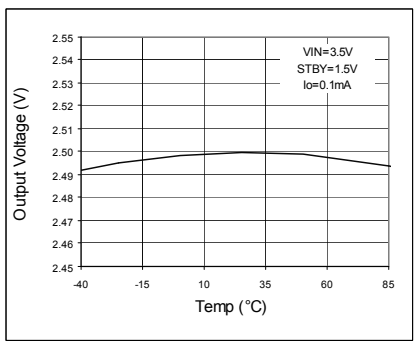


Fig.114. VOUT - Temp

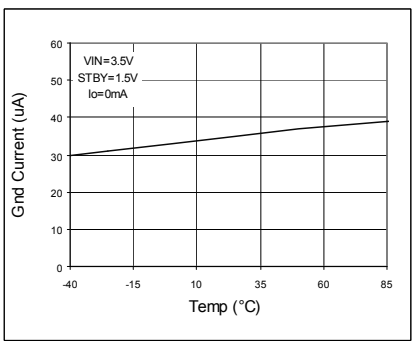


Fig.115. IGND - Temp

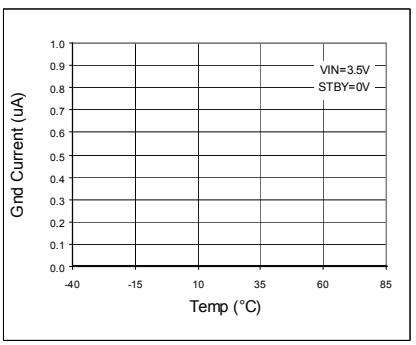


Fig.116. IGND - Temp (STBY)

●Reference data BU25TD3WG (Ta=25℃ unless otherwise specified.)

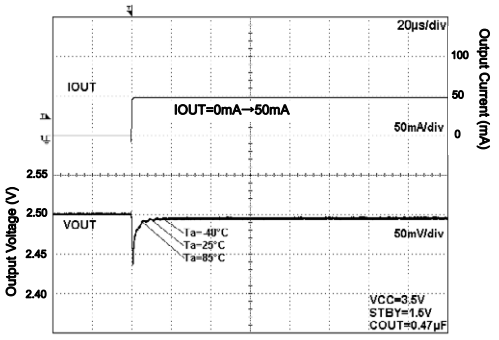


Fig.117. Load Response

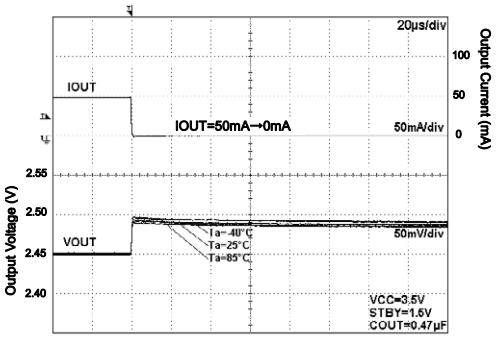


Fig.118. Load Response

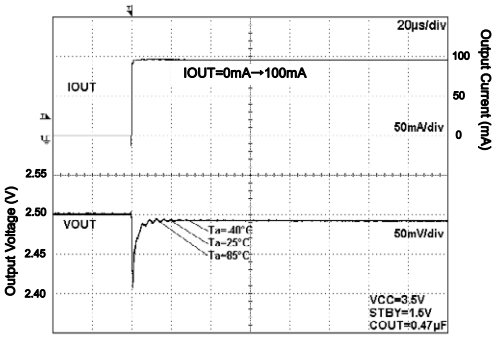


Fig.119. Load Response

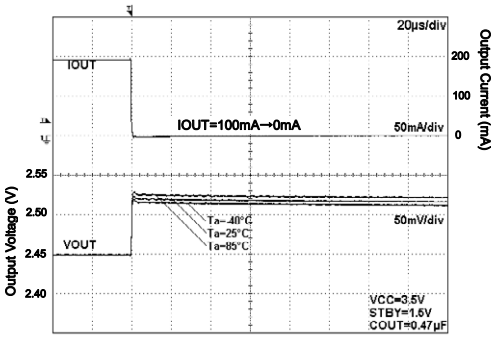


Fig.120. Load Response

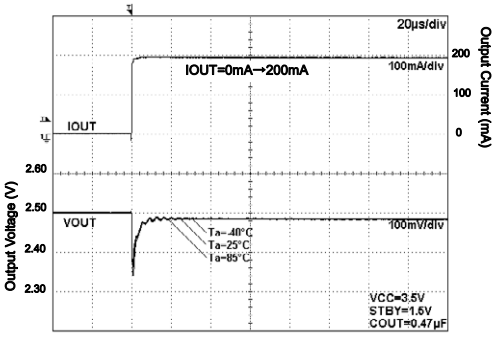


Fig.121. Load Response

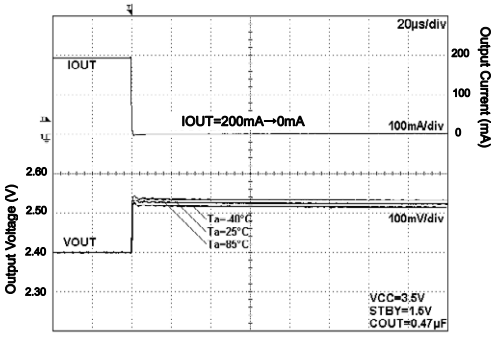


Fig.122. Load Response

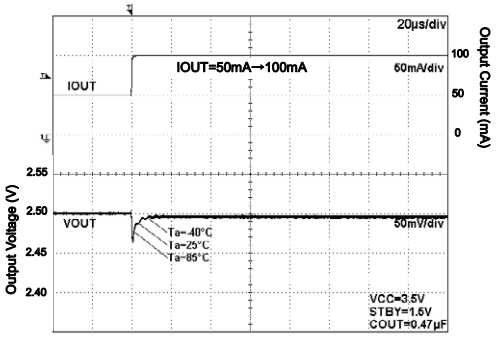


Fig.123. Load Response

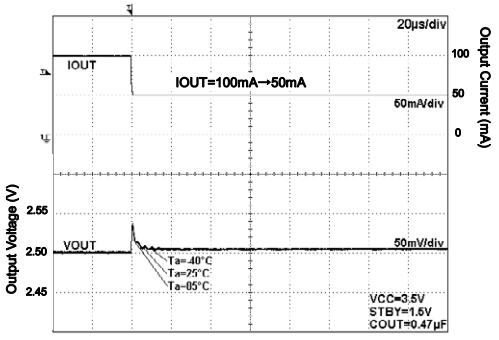


Fig.124. Load Response

●Reference data BU25TD3WG (Ta=25℃ unless otherwise specified.)

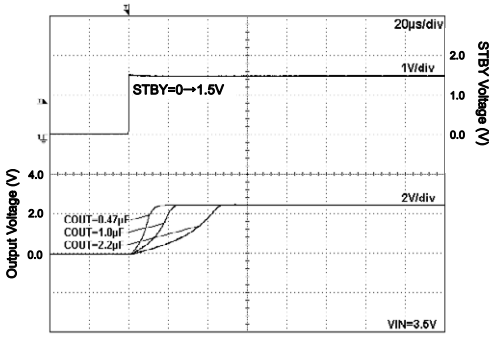


Fig.125. Start Up Time
Iout=0mA

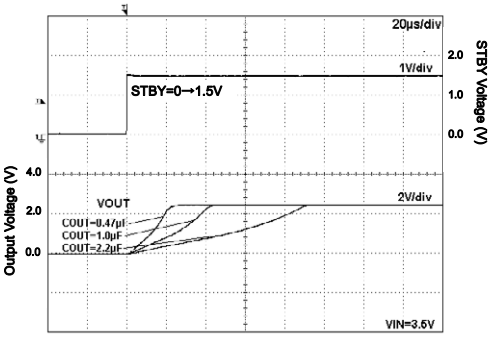


Fig.126. Start Up Time
Iout=200mA

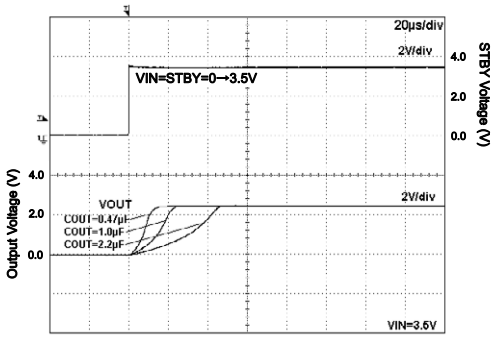


Fig.127. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

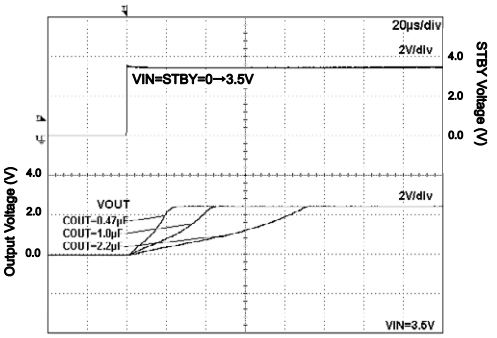


Fig.128. Start Up Time
(VIN=STBY) Iout=200mA

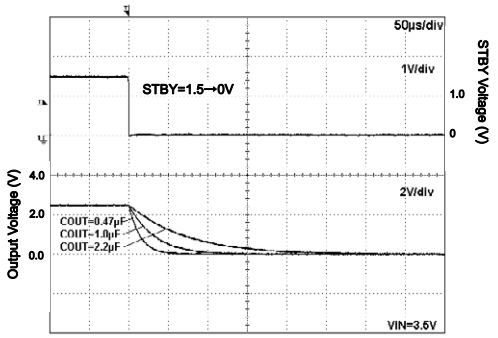


Fig.129. Discharge Time

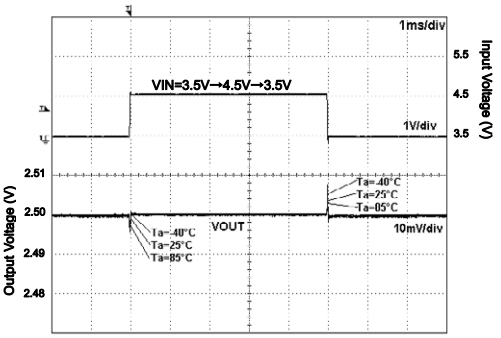


Fig.130. VIN Response

●Reference data BU26TD3WG (Ta=25℃ unless otherwise specified.)

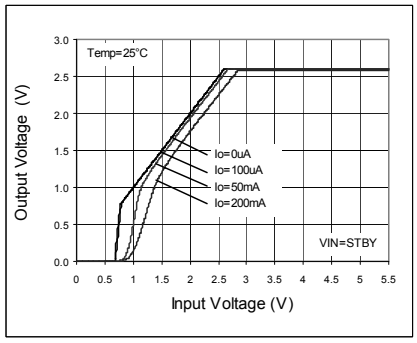


Fig.131. Output Voltage

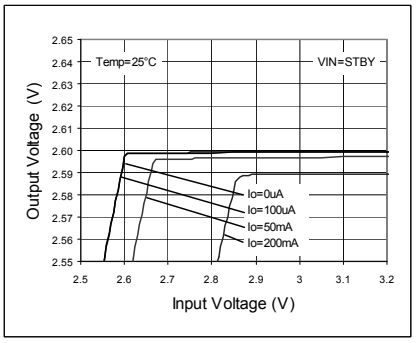


Fig.132. Line Regulation

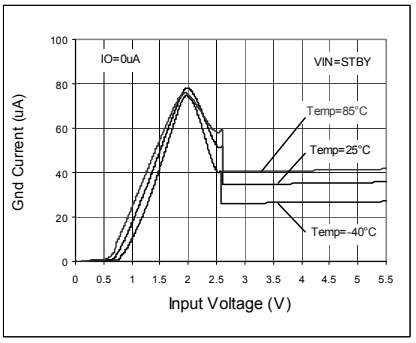


Fig.133. Circuit Current IGND

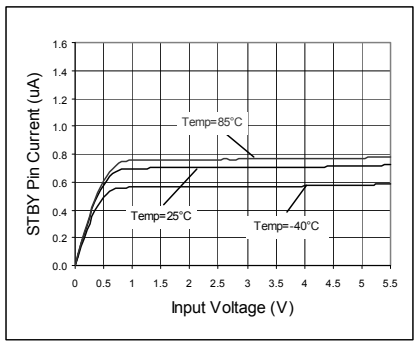


Fig.134. VSTBY - ISTBY

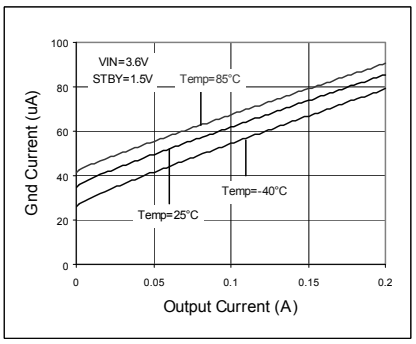


Fig.135. IOUT - IGND

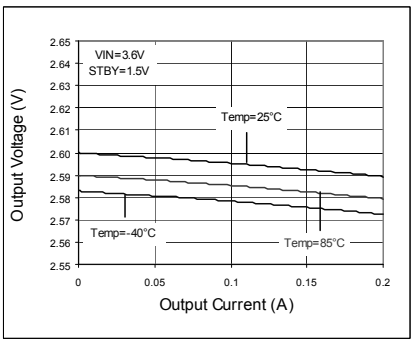


Fig.136. Load Regulation

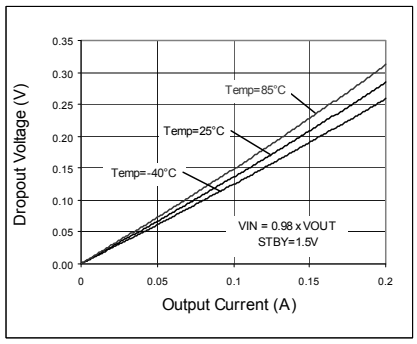


Fig.137. Dropout Voltage

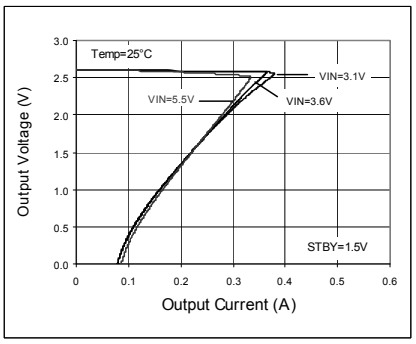


Fig.138. OCP Threshold

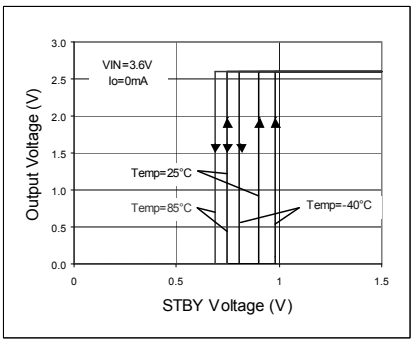


Fig.139. STBY Threshold

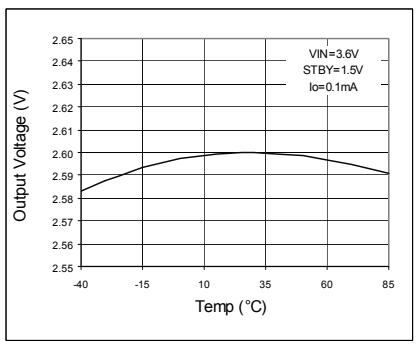


Fig.140. VOUT - Temp

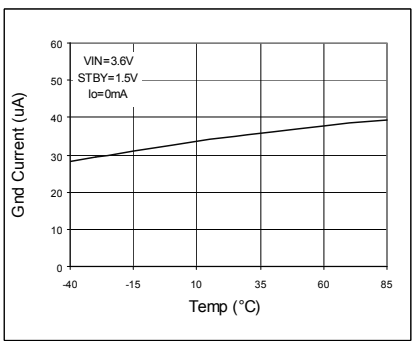


Fig.141. IGND - Temp

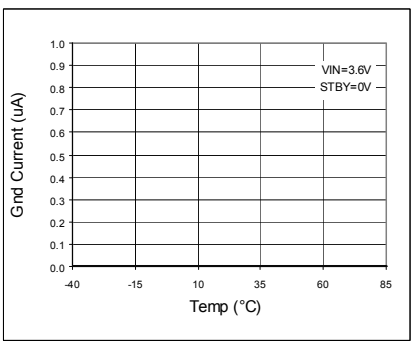


Fig.142. IGND - Temp (STBY)

●Reference data BU26TD3WG (Ta=25℃ unless otherwise specified.)

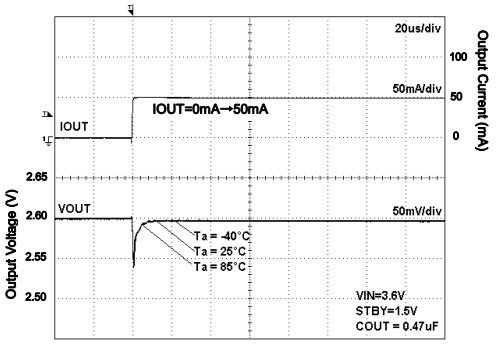


Fig.143. Load Response

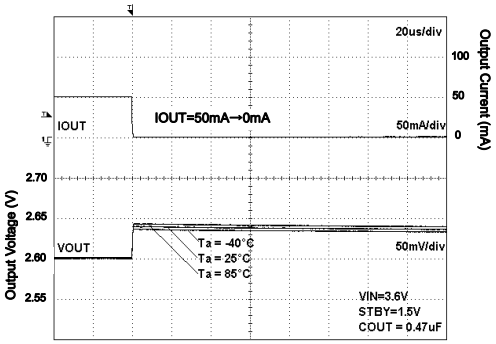


Fig.144. Load Response

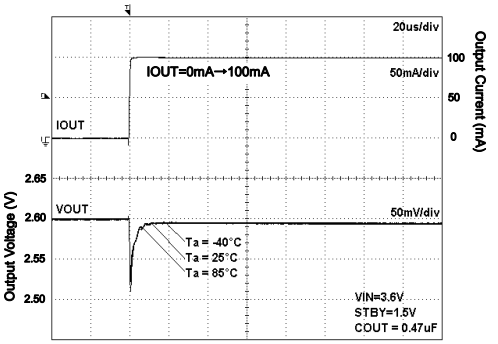


Fig.145. Load Response

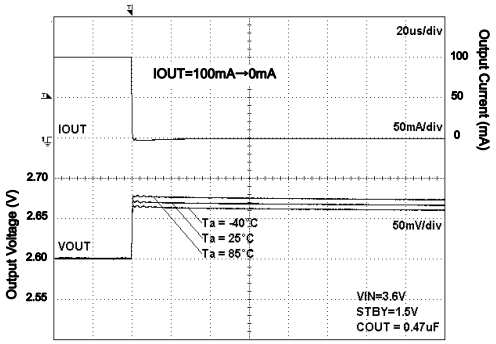


Fig.146. Load Response

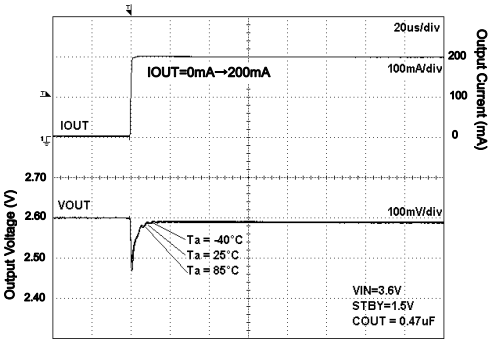


Fig.147. Load Response

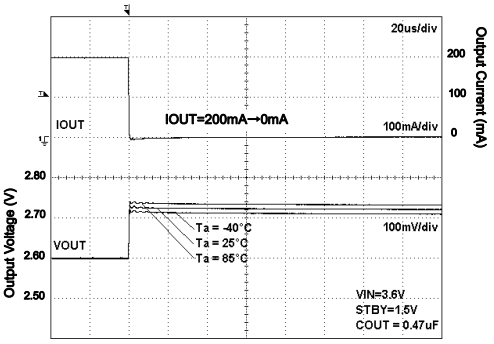


Fig.148. Load Response

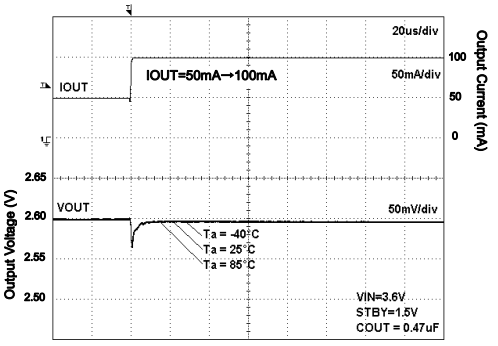


Fig.149. Load Response

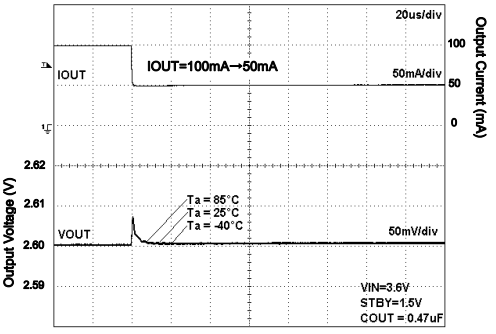


Fig.150. Load Response

●Reference data BU26TD3WG (Ta=25℃ unless otherwise specified.)

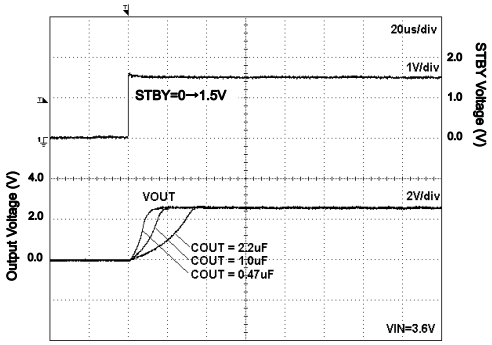


Fig.151. Start Up Time
Iout=0mA

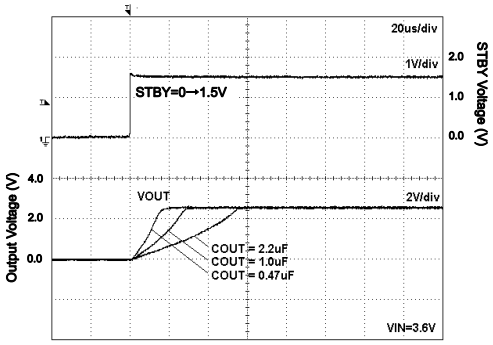


Fig.152. Start Up Time
Iout=200mA

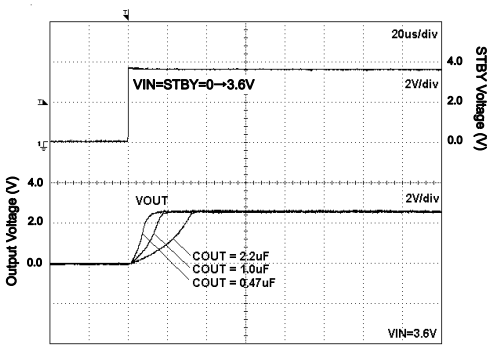


Fig.153. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

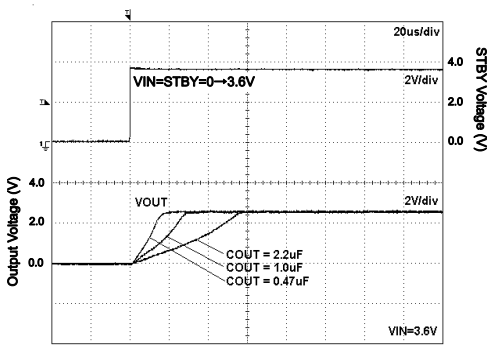


Fig.154. Start Up Time
(VIN=STBY) Iout=200mA

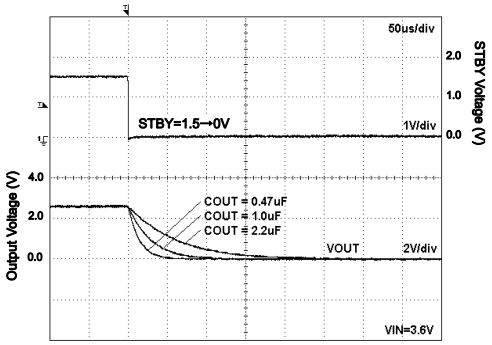


Fig.155. Discharge Time

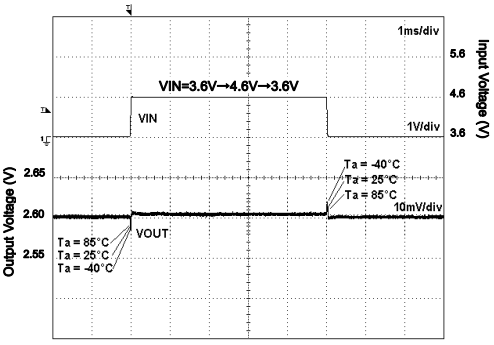


Fig.156. VIN Response

●Reference data BU27TD3WG (Ta=25℃ unless otherwise specified.)

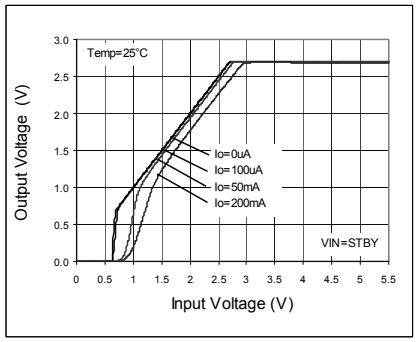


Fig.157. Output Voltage

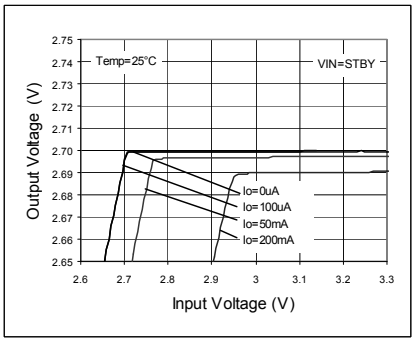


Fig.158. Line Regulation

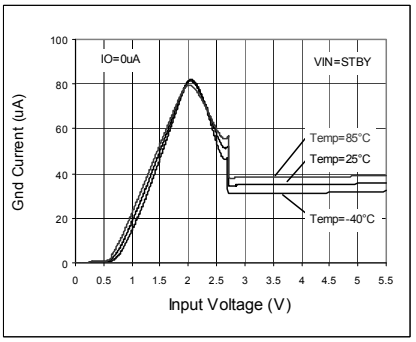


Fig.159. Circuit Current IGND

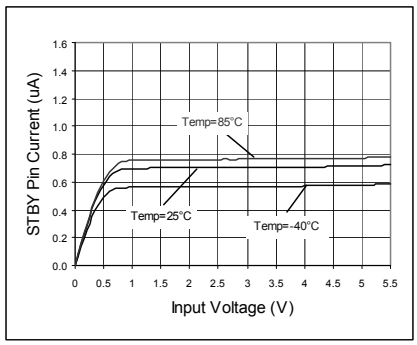


Fig.160. VSTBY - ISTBY

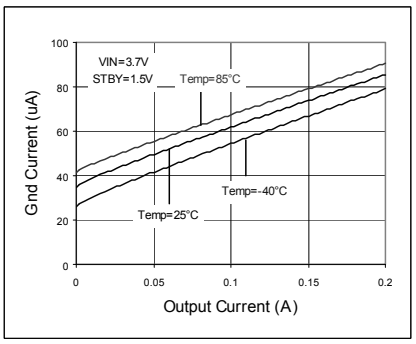


Fig.161. IOUT - IGND

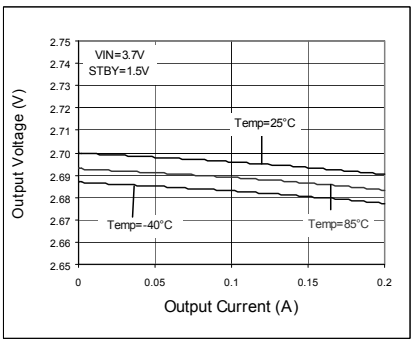


Fig.162. Load Regulation

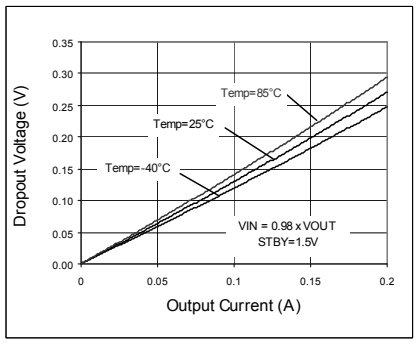


Fig.163. Dropout Voltage

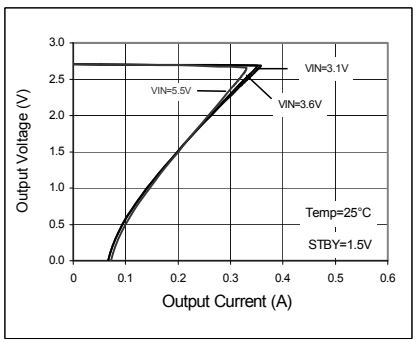


Fig.164. OCP Threshold

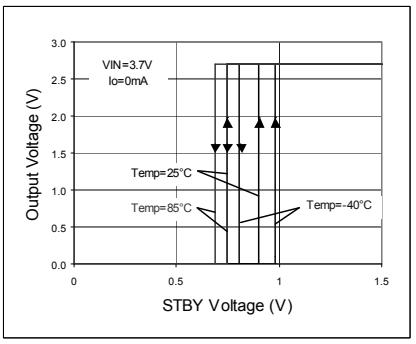


Fig.165. STBY Threshold

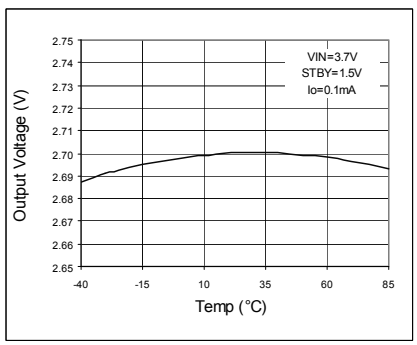


Fig.166. VOUT - Temp

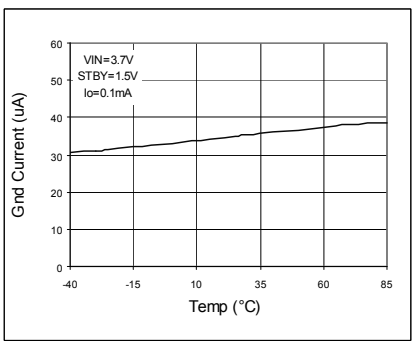


Fig.167. IGND - Temp

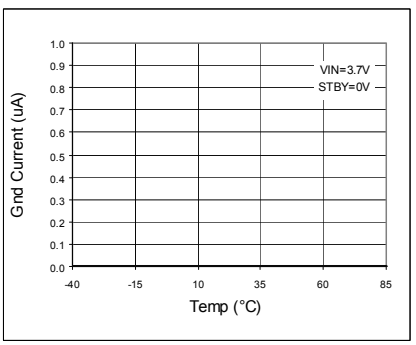


Fig.168. IGND - Temp (STBY)

●Reference data BU27TD3WG (Ta=25℃ unless otherwise specified.)

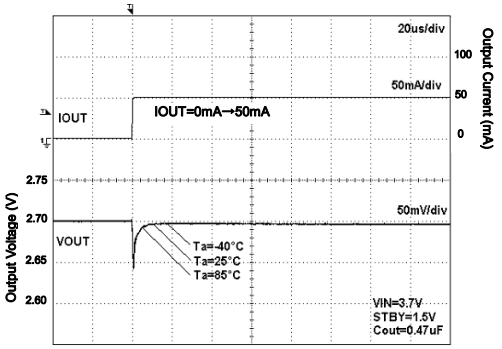


Fig.169. Load Response

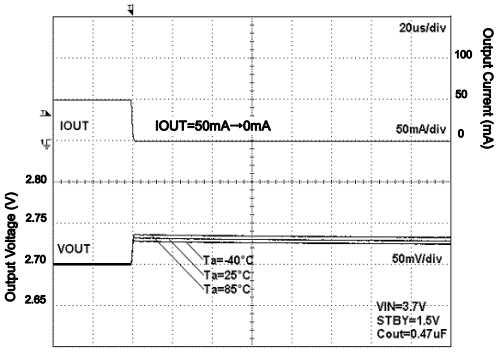


Fig.170. Load Response

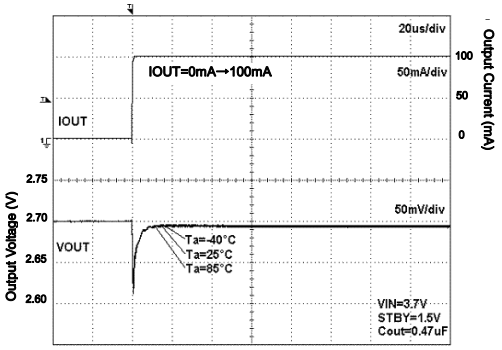


Fig.171. Load Response

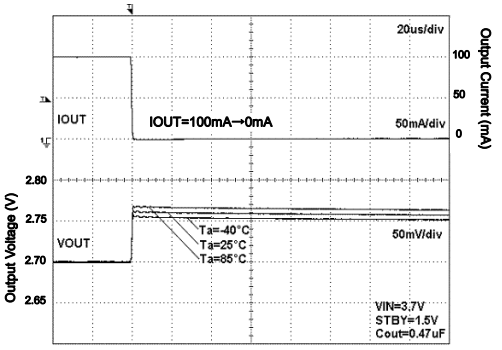


Fig.172. Load Response

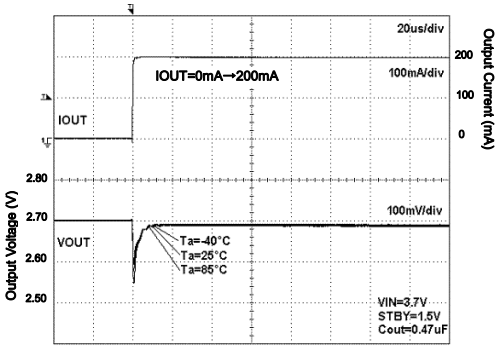


Fig.173. Load Response

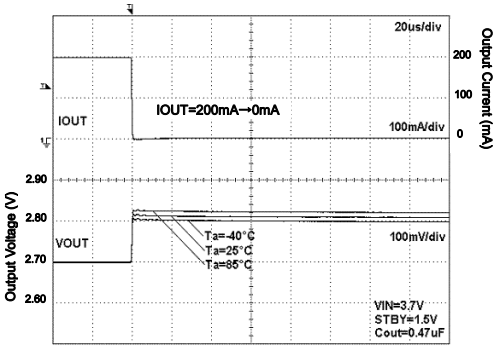


Fig.174. Load Response

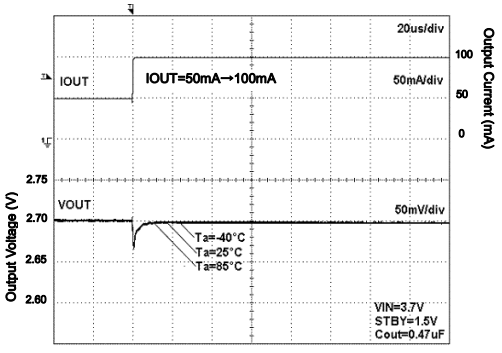


Fig.175. Load Response

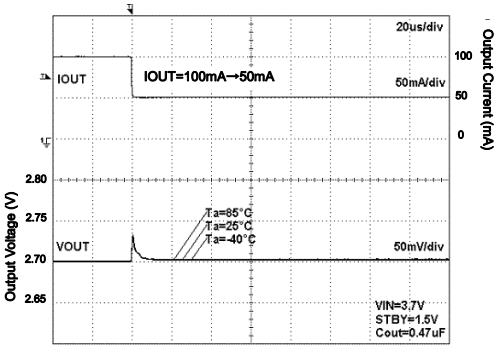


Fig.176. Load Response

●Reference data BU27TD3WG (Ta=25℃ unless otherwise specified.)

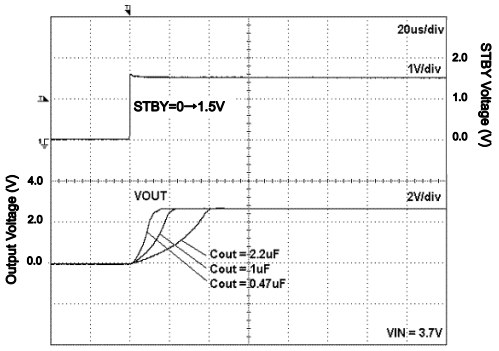


Fig.177. Start Up Time
Iout=0mA

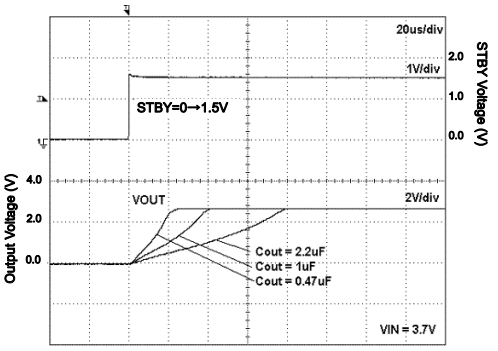


Fig.178. Start Up Time
Iout=200mA

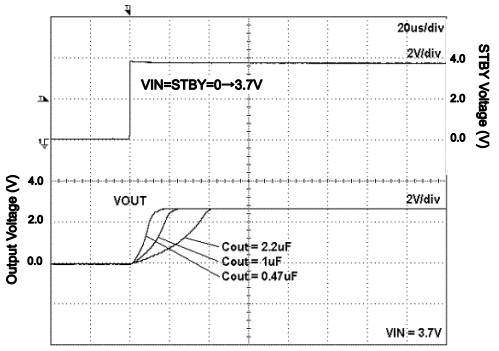


Fig.179. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

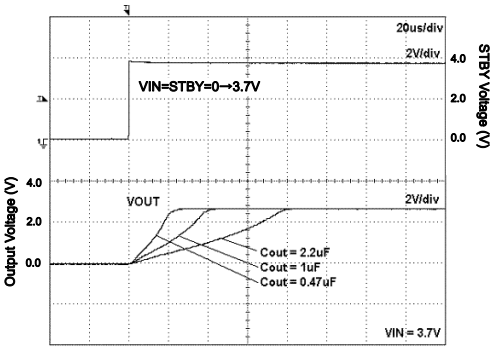


Fig.180. Start Up Time
(VIN=STBY) Iout=200mA

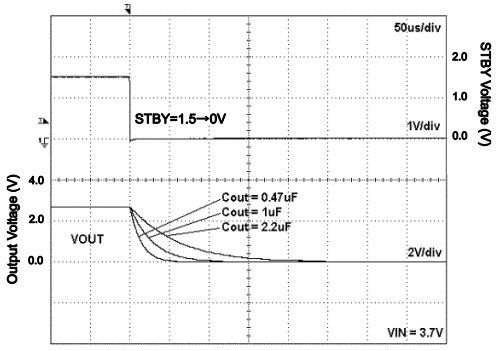


Fig.181. Discharge Time

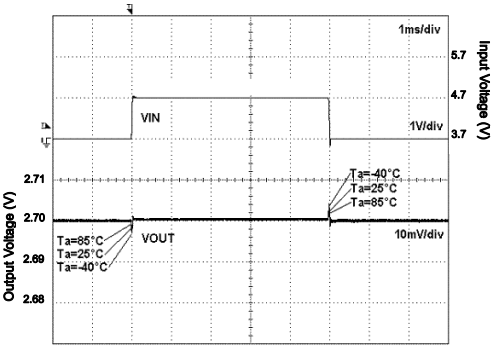


Fig.182. VIN Response

●Reference data BU28TD3WG (Ta=25℃ unless otherwise specified.)

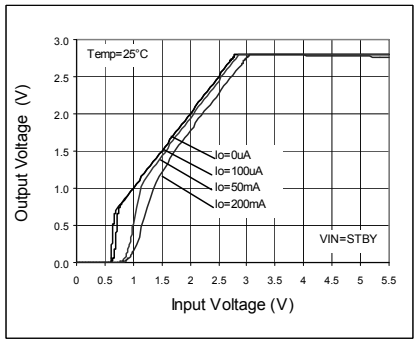


Fig.183. Output Voltage

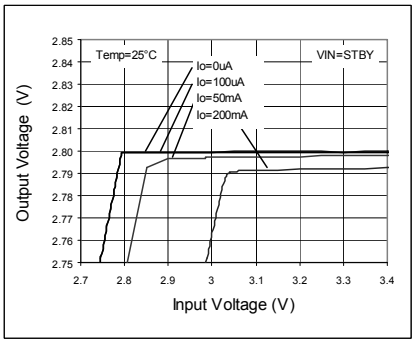


Fig.184. Line Regulation

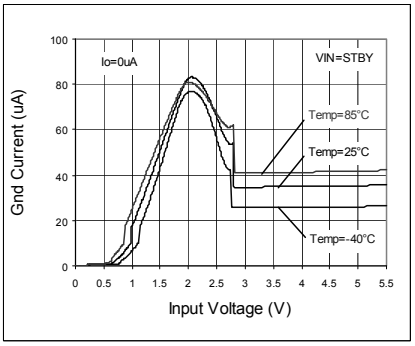


Fig.185. Circuit Current IGND

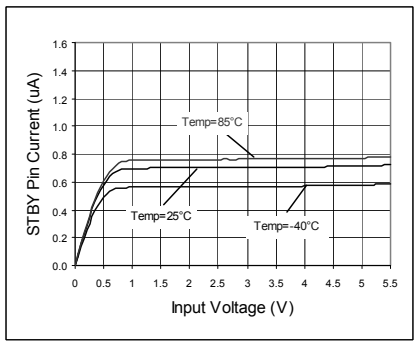


Fig.186. VSTBY - ISTBY

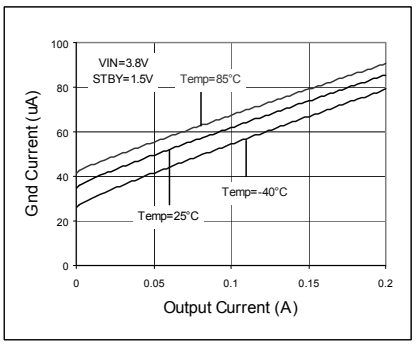


Fig.187. IOUT - IGND

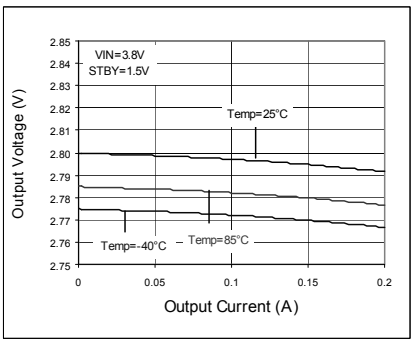


Fig.188. Load Regulation

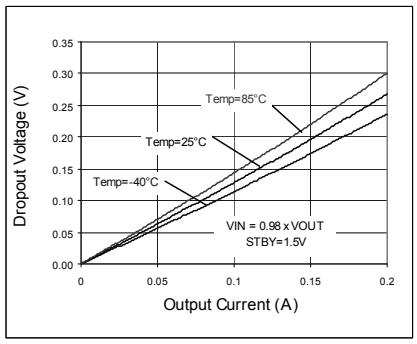


Fig.189. Dropout Voltage

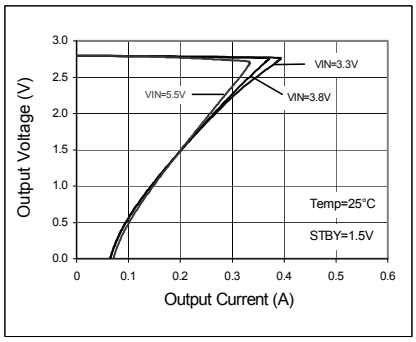


Fig.190. OCP Threshold

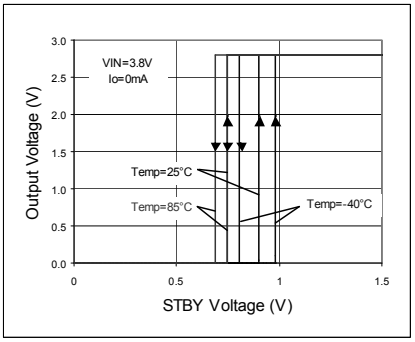


Fig.191. STBY Threshold

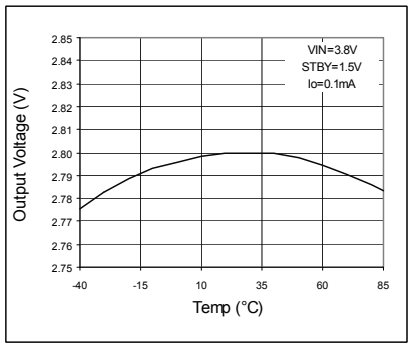


Fig.192. VOUT - Temp

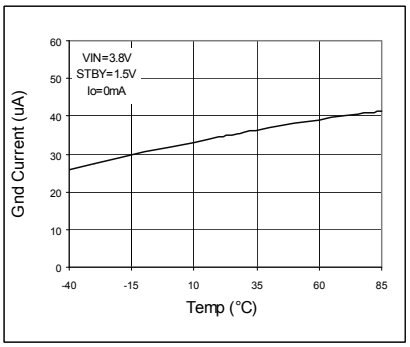


Fig.193. IGND - Temp

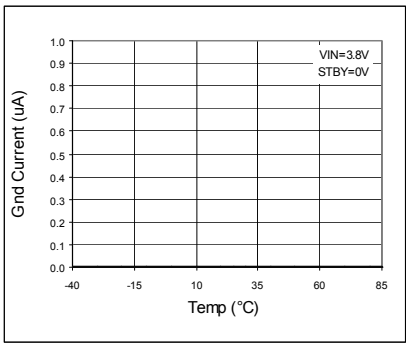


Fig.194. IGND - Temp (STBY)

●Reference data BU28TD3WG (Ta=25℃ unless otherwise specified.)

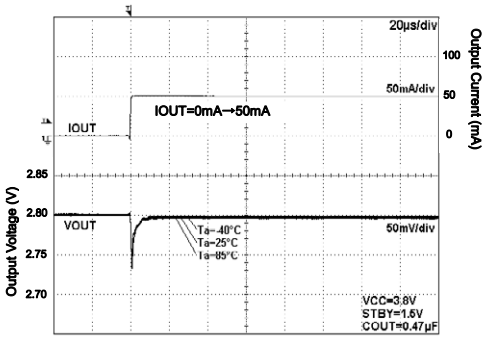


Fig.195. Load Response

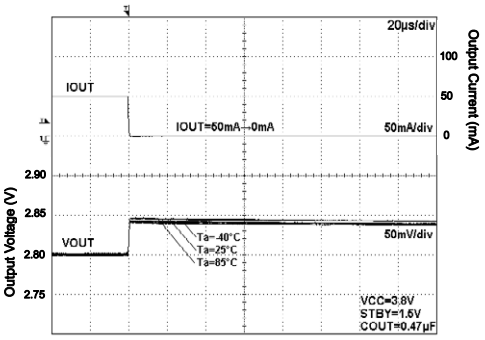


Fig.196. Load Response

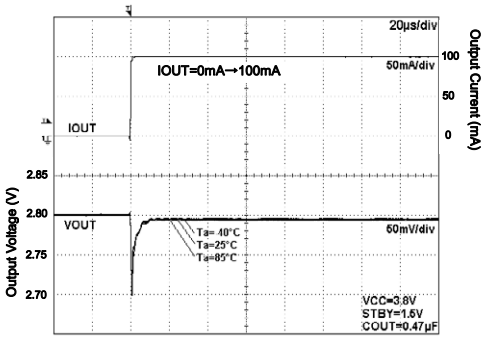


Fig.197. Load Response

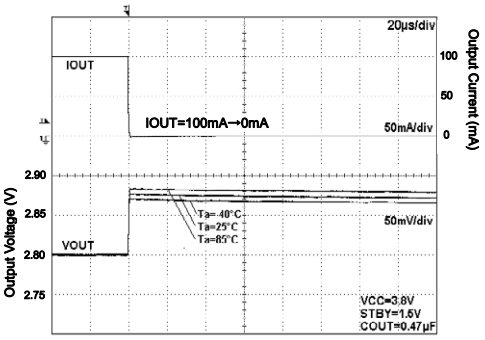


Fig.198. Load Response

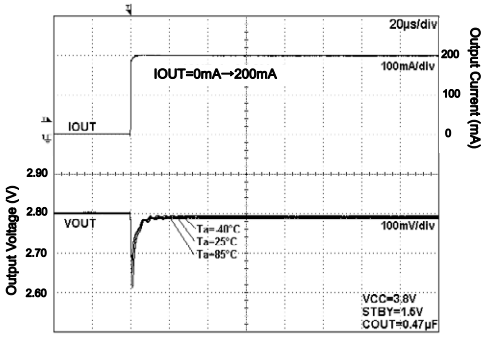


Fig.199. Load Response

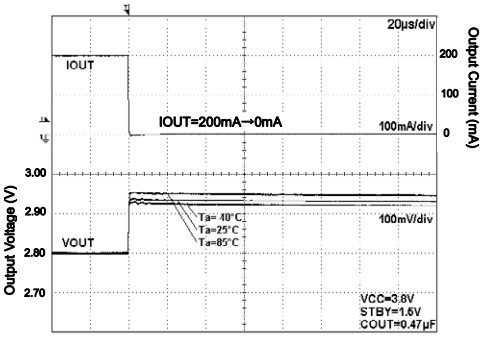


Fig.200. Load Response

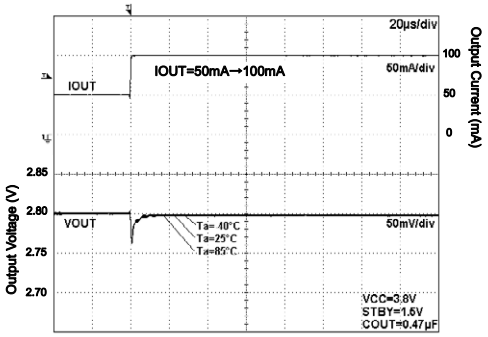


Fig.201. Load Response

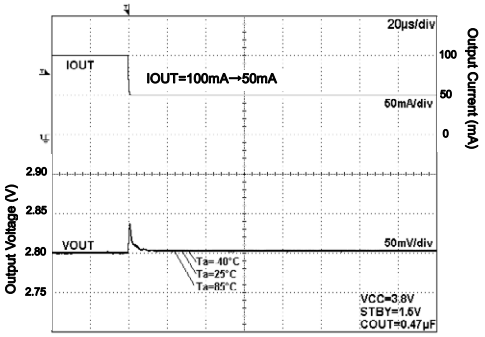


Fig.202. Load Response

●Reference data BU28TD3WG (Ta=25℃ unless otherwise specified.)

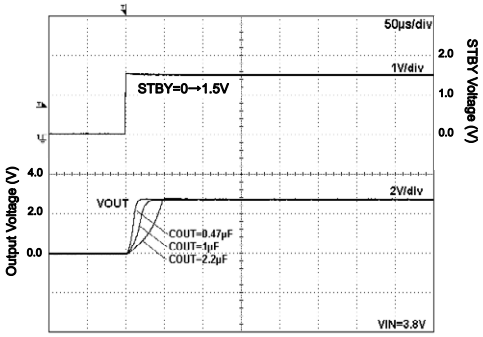


Fig.203. Start Up Time
Iout=0mA

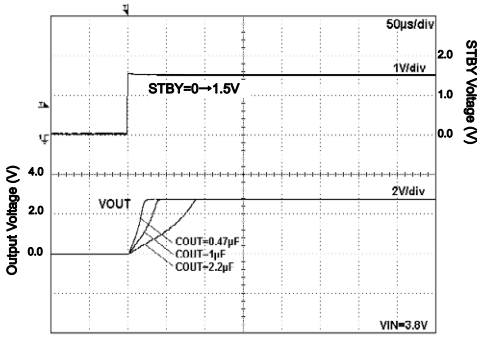


Fig.204. Start Up Time
Iout=200mA

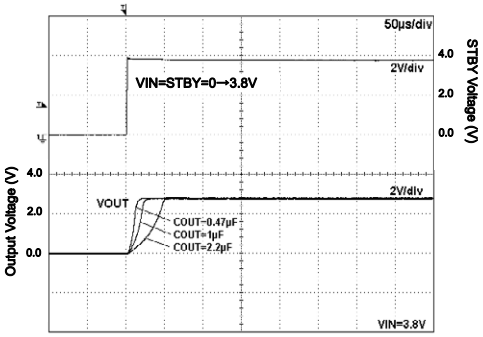


Fig.205. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

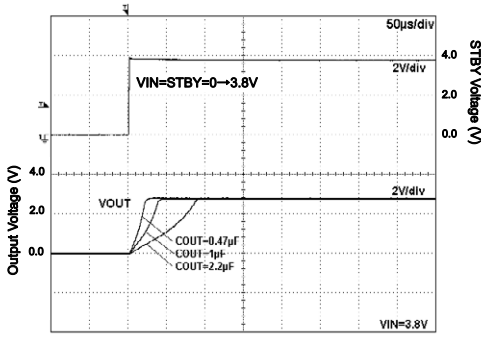


Fig.206. Start Up Time
(VIN=STBY) Iout=200mA

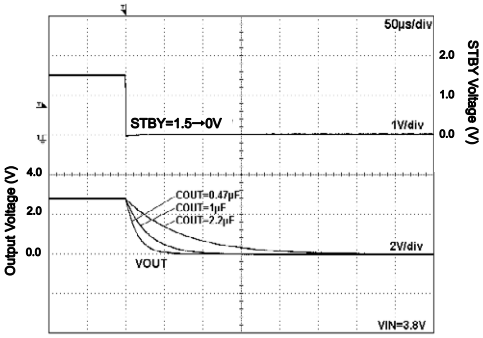


Fig.207. Discharge Time

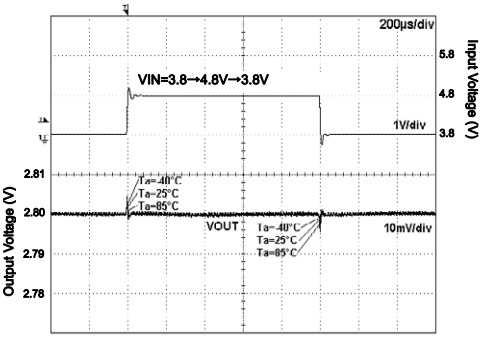


Fig.208. VIN Response

●Reference data BU30TD3WG (Ta=25℃ unless otherwise specified.)

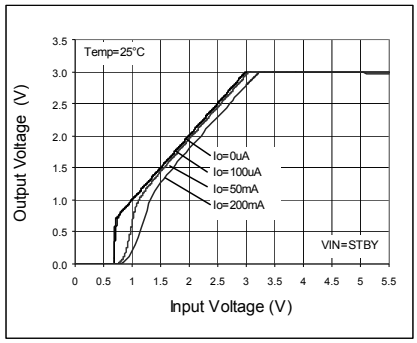


Fig.209. Output Voltage

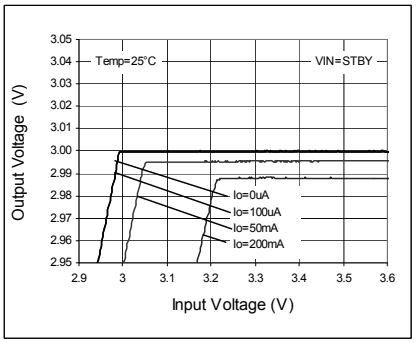


Fig.210. Line Regulation

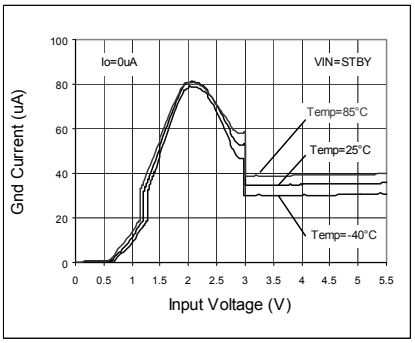


Fig.211. Circuit Current IGND

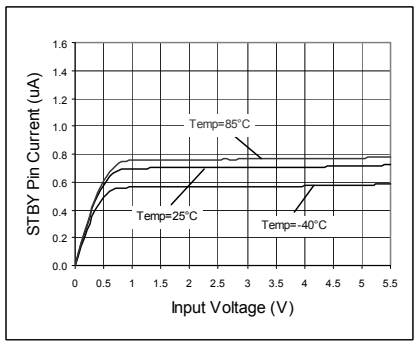


Fig.212. VSTBY - ISTBY

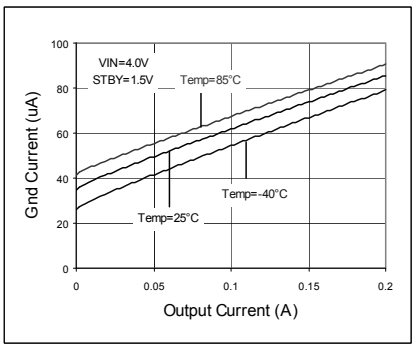


Fig.213. IOUT - IGND

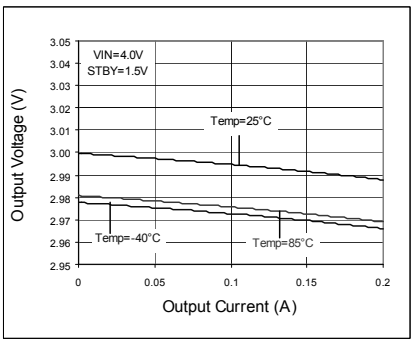


Fig.214. Load Regulation

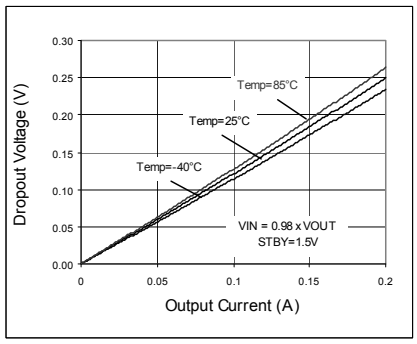


Fig.215. Dropout Voltage

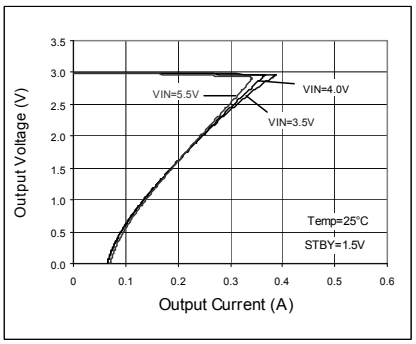


Fig.216. OCP Threshold

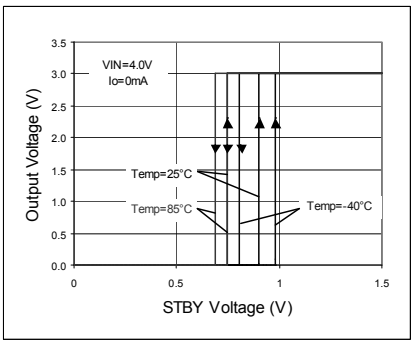


Fig.217. STBY Threshold

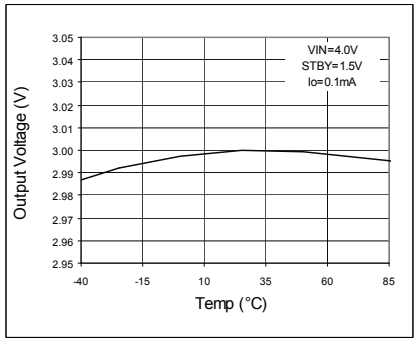


Fig.218. VOUT - Temp

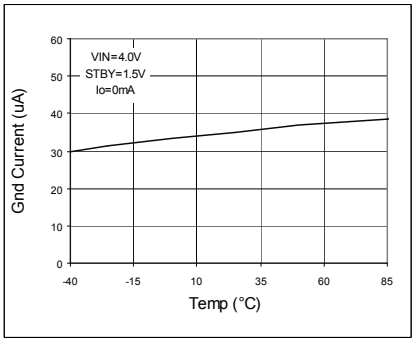


Fig.219. IGND - Temp

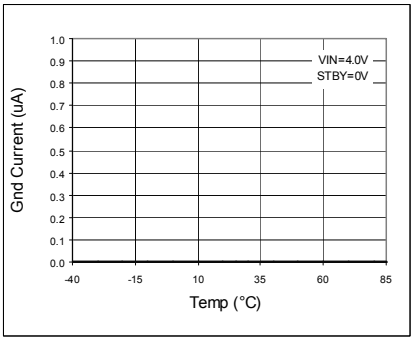


Fig.220. IGND - Temp (STBY)

●Reference data BU30TD3WG (Ta=25℃ unless otherwise specified.)

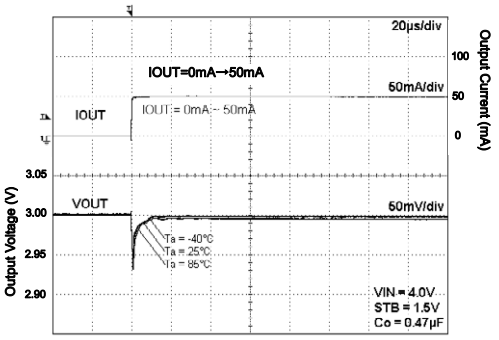


Fig.221. Load Response

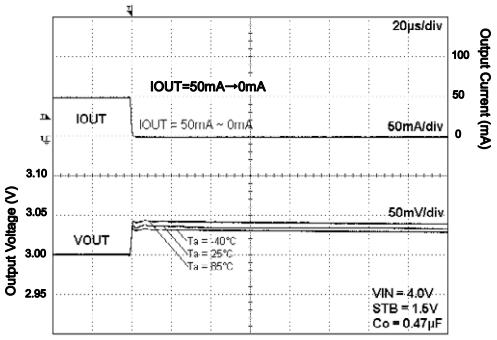


Fig.222. Load Response

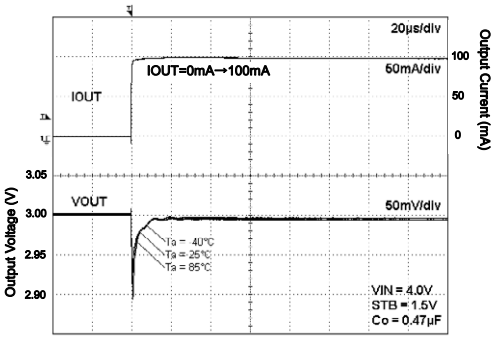


Fig.223. Load Response

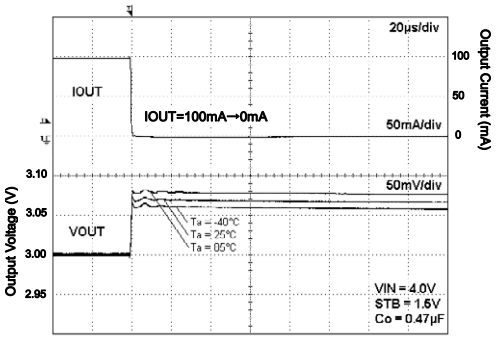


Fig.224. Load Response

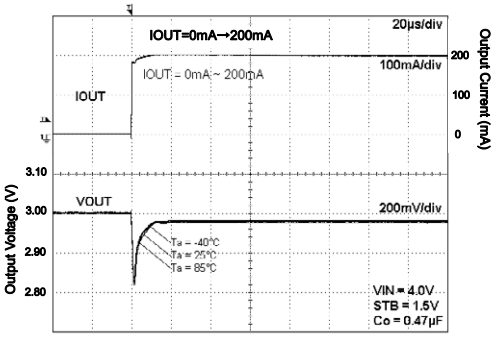


Fig.225. Load Response

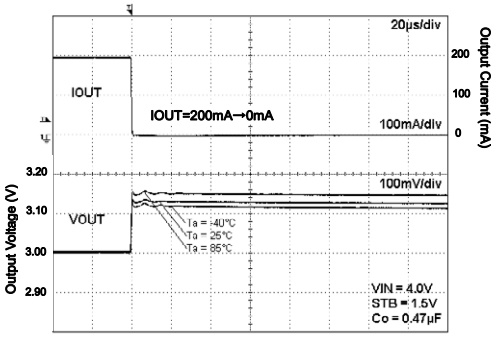


Fig.226. Load Response

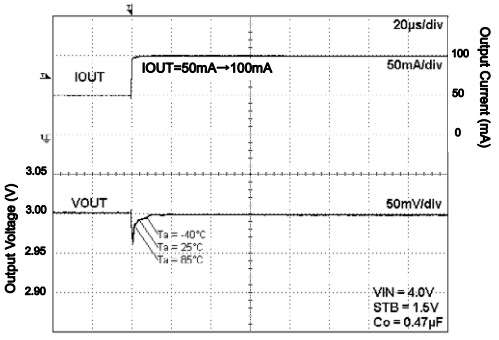


Fig.227. Load Response

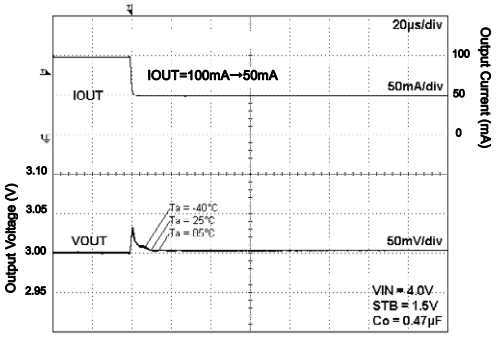


Fig.228. Load Response

●Reference data BU30TD3WG (Ta=25℃ unless otherwise specified.)

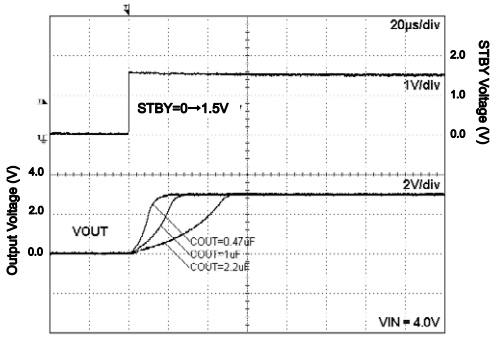


Fig.229. Start Up Time
Iout=0mA

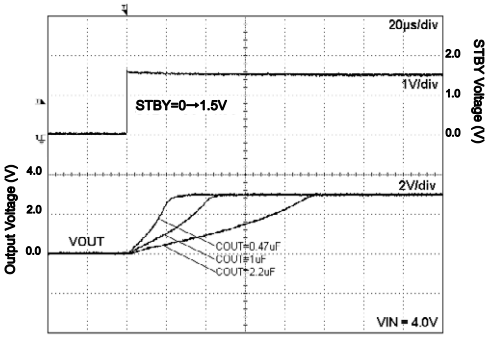


Fig.230. Start Up Time
Iout=200mA

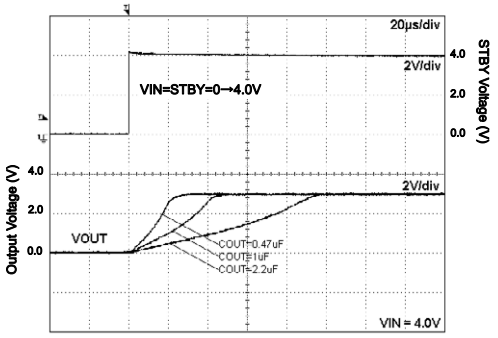


Fig.231. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

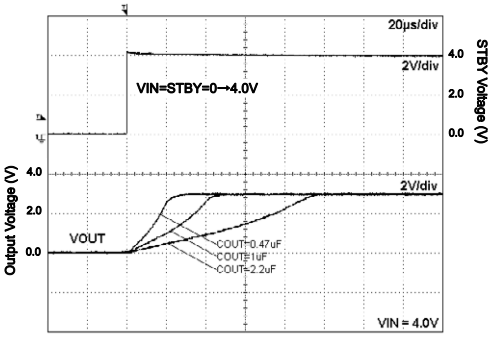


Fig.232. Start Up Time
(VIN=STBY) Iout=200mA

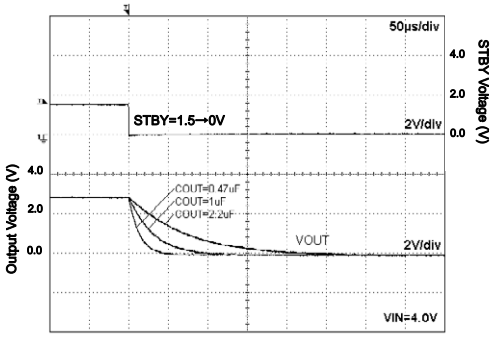


Fig.233. Discharge Time

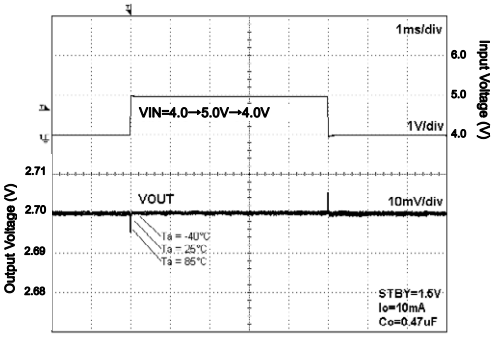


Fig.234. VIN Response

●Reference data BU31TD3WG (Ta=25℃ unless otherwise specified.)

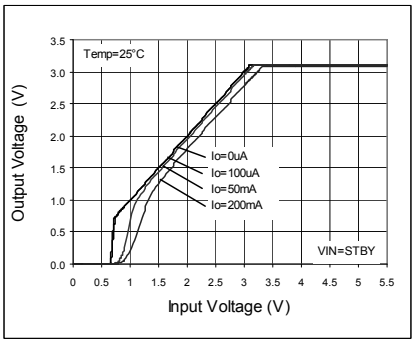


Fig.235. Output Voltage

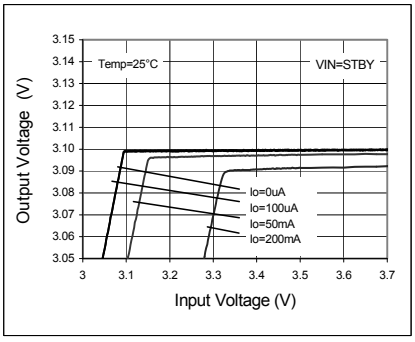


Fig.236. Line Regulation

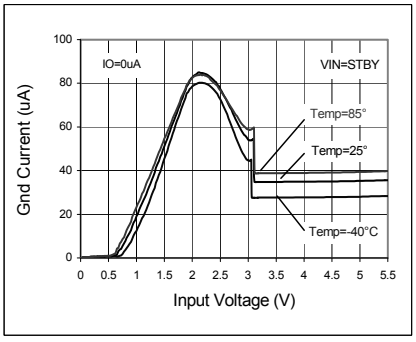


Fig.237. Circuit Current IGND

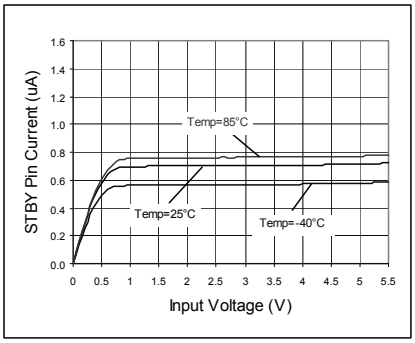


Fig.238. VSTBY - ISTBY

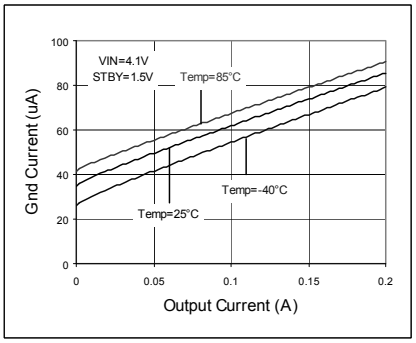


Fig.239. IOUT - IGND

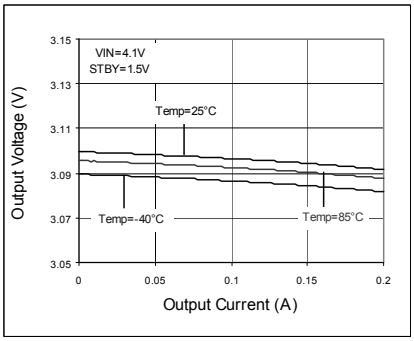


Fig.240. Load Regulation

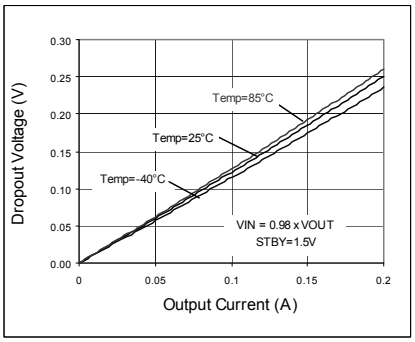


Fig.241. Dropout Voltage

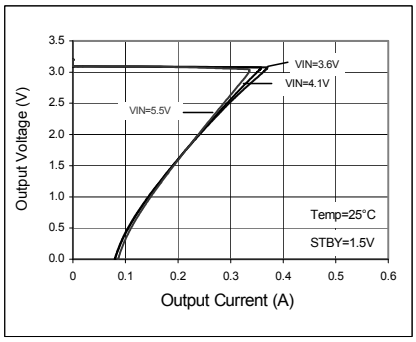


Fig.242. OCP Threshold

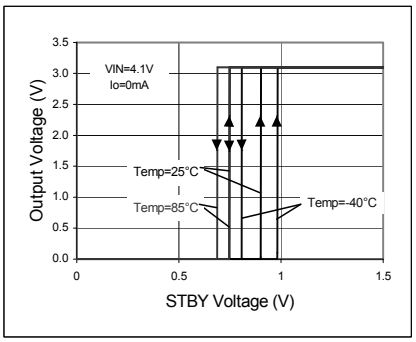


Fig.243. STBY Threshold

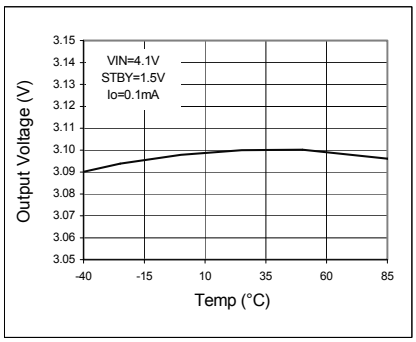


Fig.244. VOUT - Temp

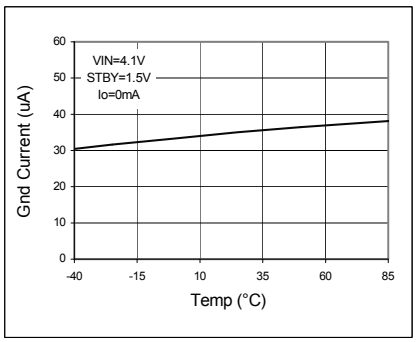


Fig.245. IGND - Temp

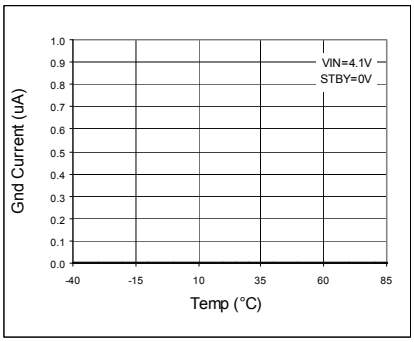


Fig.246. IGND - Temp (STBY)

●Reference data BU31TD3WG (Ta=25℃ unless otherwise specified.)

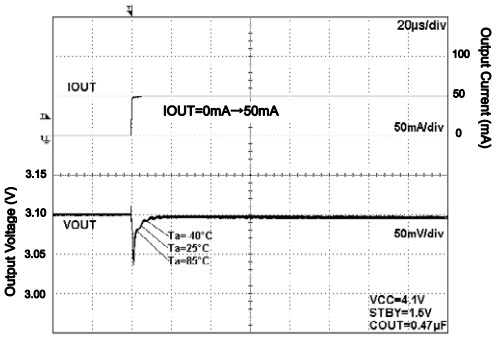


Fig.247. Load Response

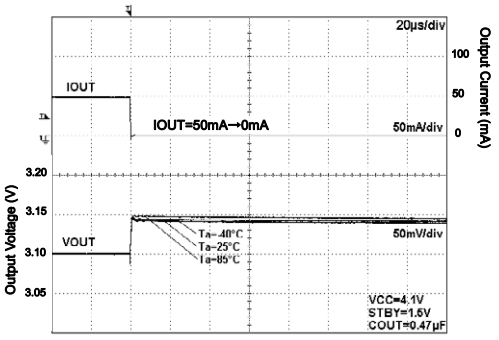


Fig.248. Load Response

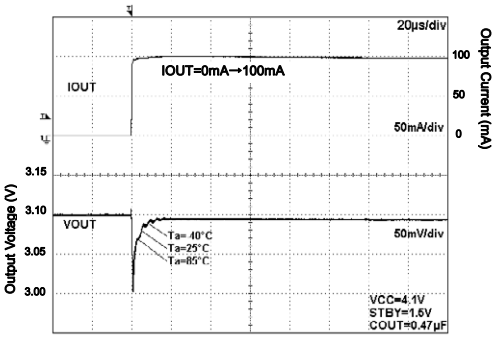


Fig.249. Load Response

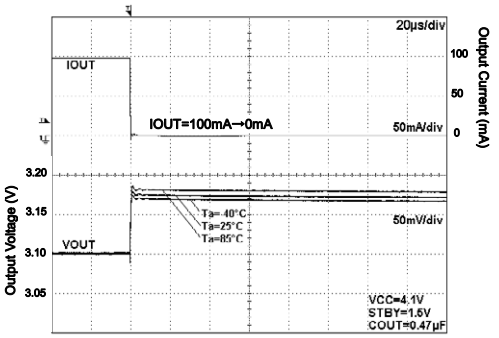


Fig.250. Load Response

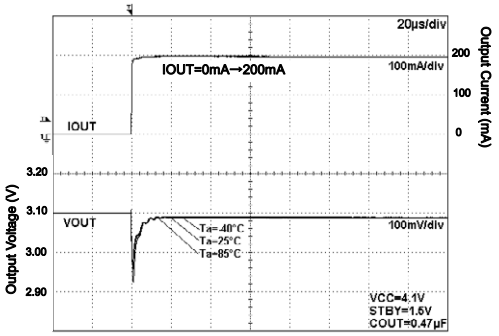


Fig.251. Load Response

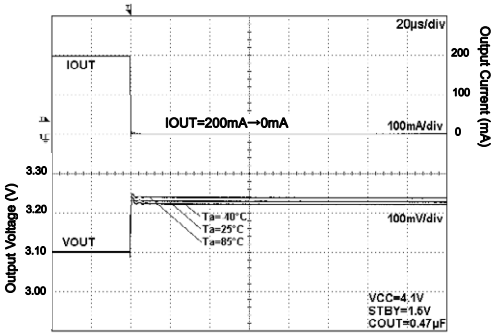


Fig.252. Load Response

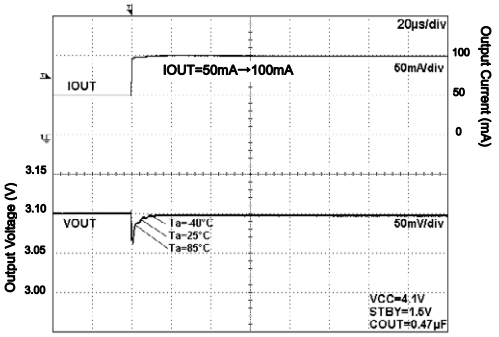


Fig.253. Load Response

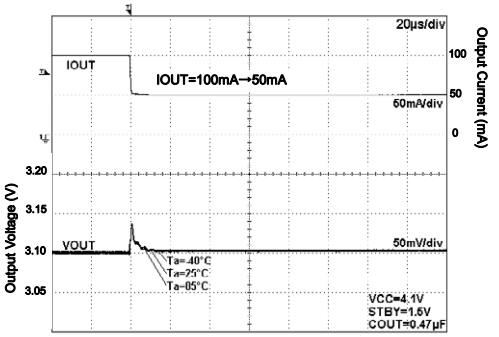


Fig.254. Load Response

●Reference data BU31TD3WG (Ta=25℃ unless otherwise specified.)

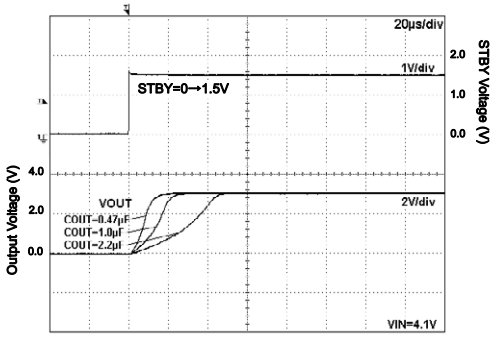


Fig.255. Start Up Time
Iout=0mA

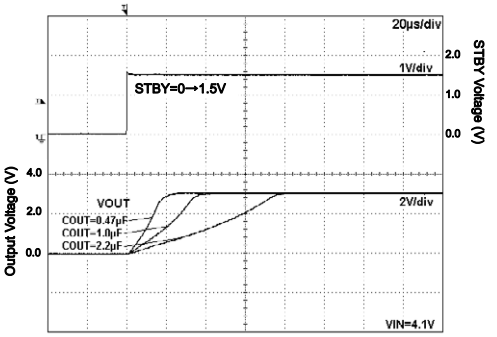


Fig.256. Start Up Time
Iout=200mA

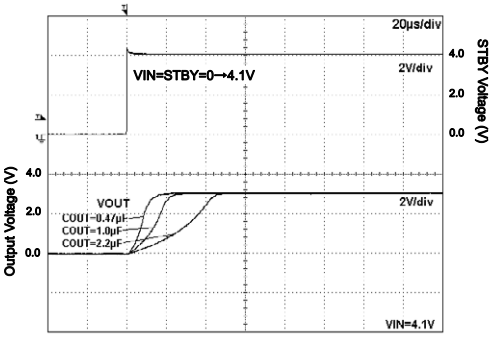


Fig.257. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

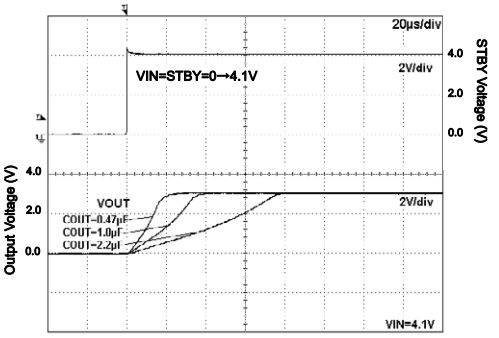


Fig.258. Start Up Time
(VIN=STBY) Iout=200mA

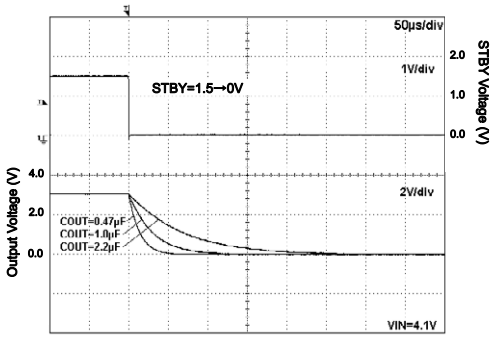


Fig.259. Discharge Time

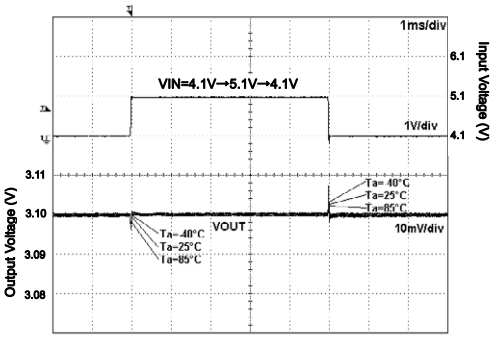


Fig.260. VIN Response

●Reference data BU33TD3WG (Ta=25℃ unless otherwise specified.)

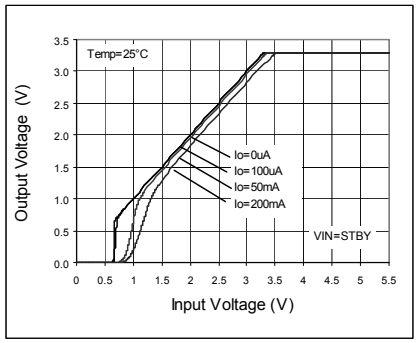


Fig.261. Output Voltage

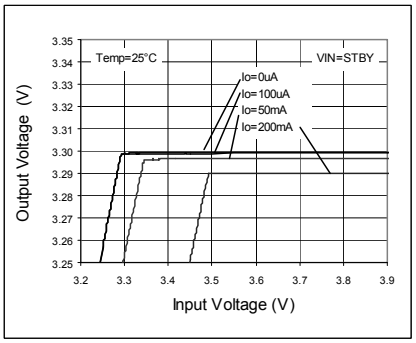


Fig.262. Line Regulation

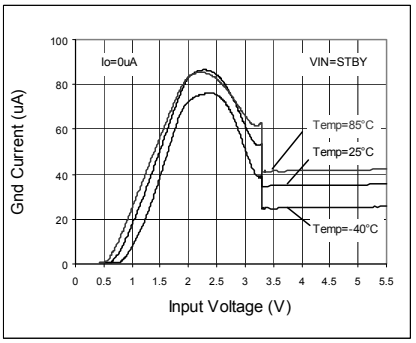


Fig.263. Circuit Current IGND

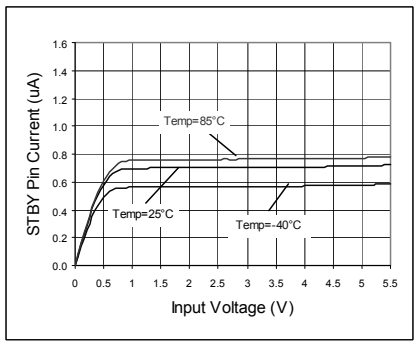


Fig.264. VSTBY - ISTBY

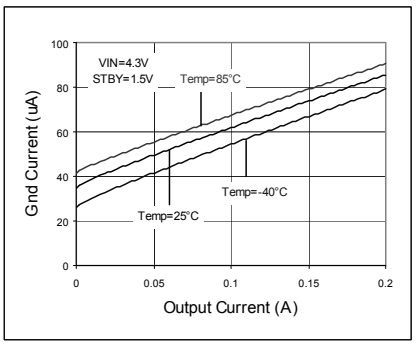


Fig.265. IOUT - IGND

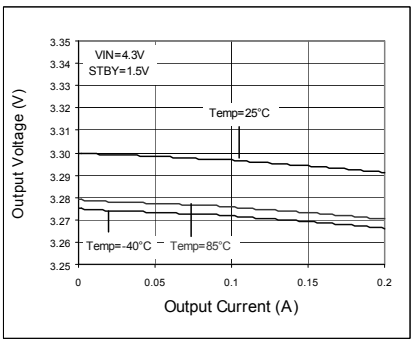


Fig.266. Load Regulation

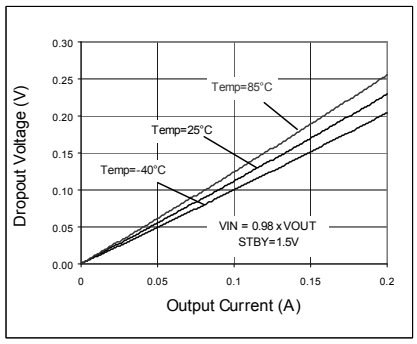


Fig.267. Dropout Voltage

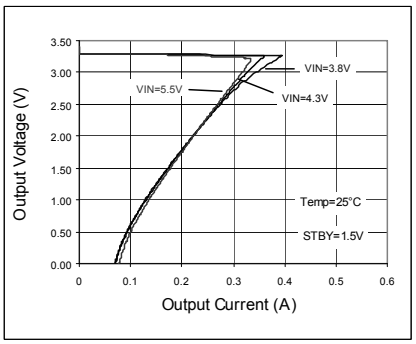


Fig.268. OCP Threshold

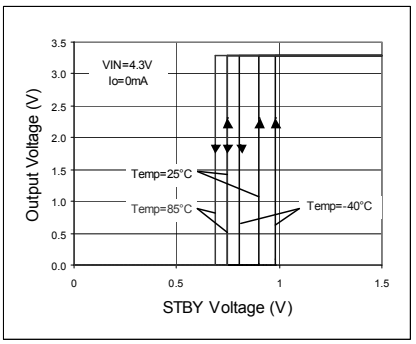


Fig.269. STBY Threshold

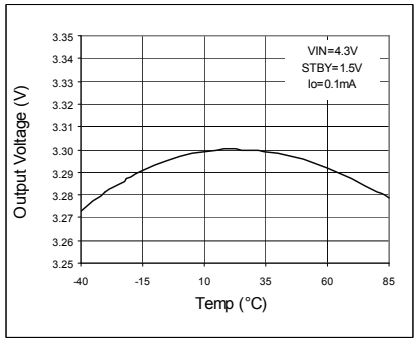


Fig.270. VOUT - Temp

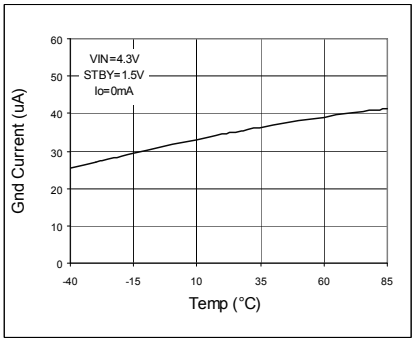


Fig.271. IGND - Temp

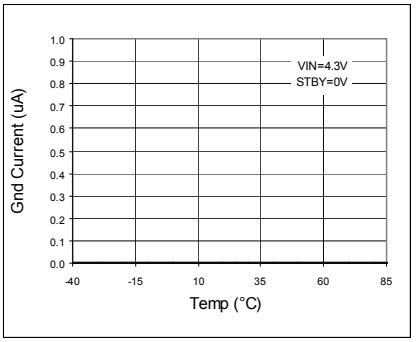


Fig.272. IGND - Temp (STBY)

●Reference data BU33TD3WG (Ta=25℃ unless otherwise specified.)

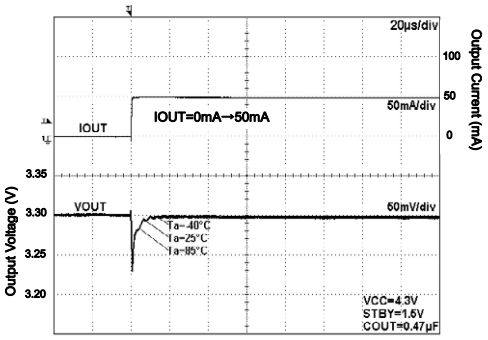


Fig.273. Load Response

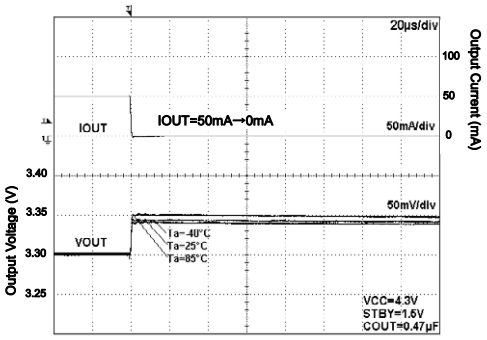


Fig.274. Load Response

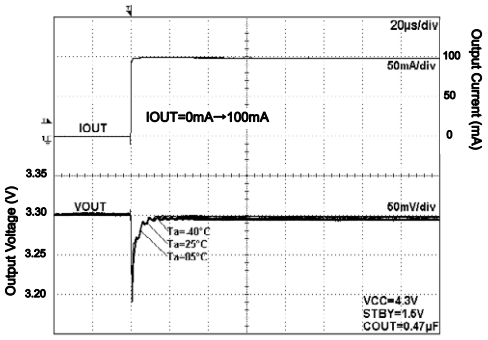


Fig.275. Load Response

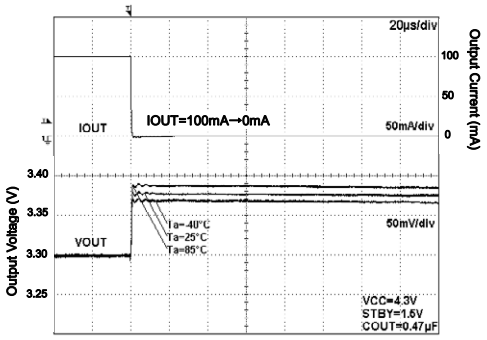


Fig.276. Load Response

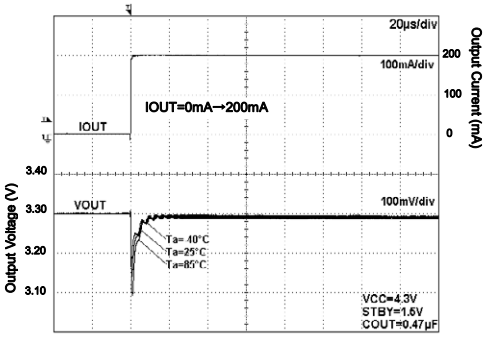


Fig.277. Load Response

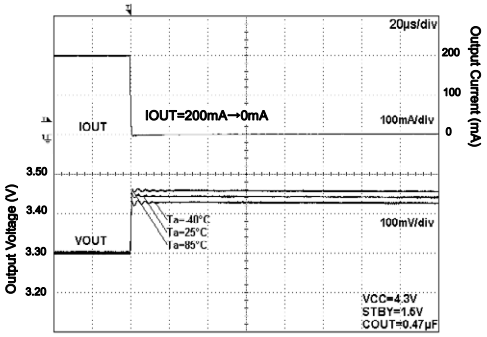


Fig.278. Load Response

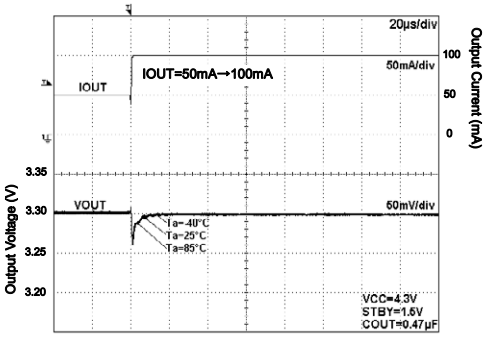


Fig.279. Load Response

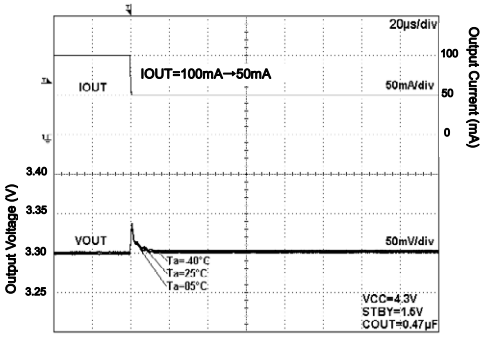


Fig.280. Load Response

●Reference data BU33TD3WG (Ta=25℃ unless otherwise specified.)

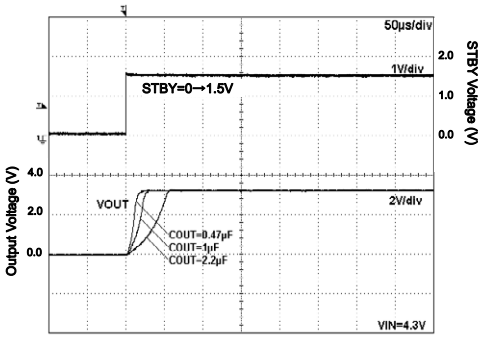


Fig.281. Start Up Time
Iout=0mA

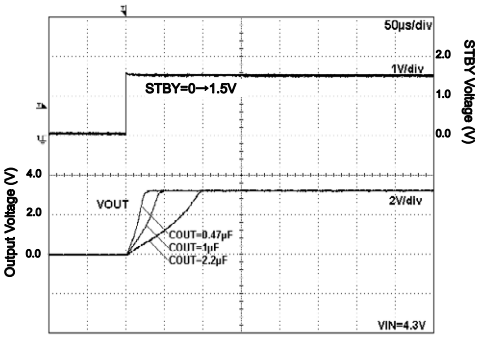


Fig.282. Start Up Time
Iout=200mA

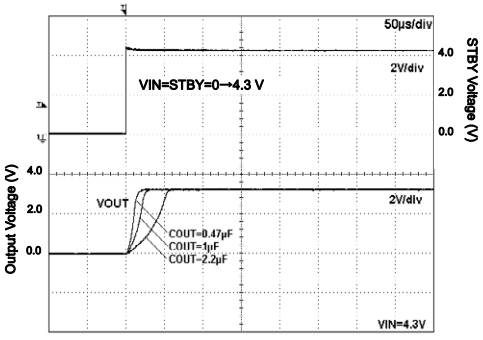


Fig.283. Start Up Time
(VIN=STBY) Iout=0mA
Iout=0mA

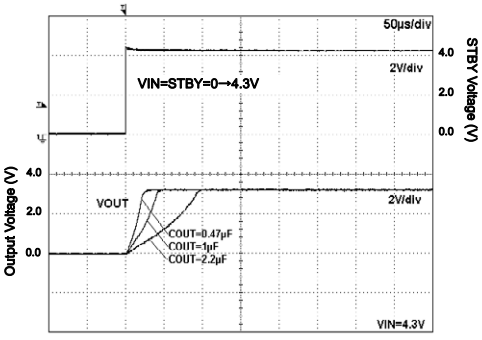


Fig.284. Start Up Time
(VIN=STBY) Iout=200mA

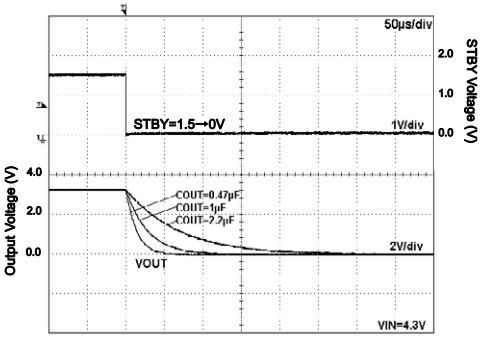


Fig.285. Discharge Time

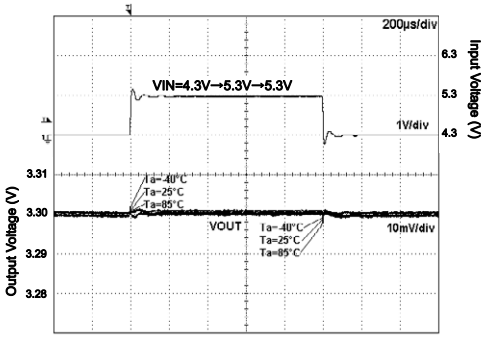


Fig.286. VIN Response

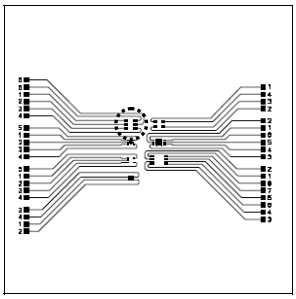
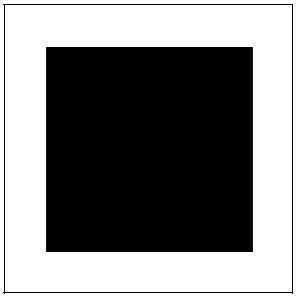
●About power dissipation (Pd)

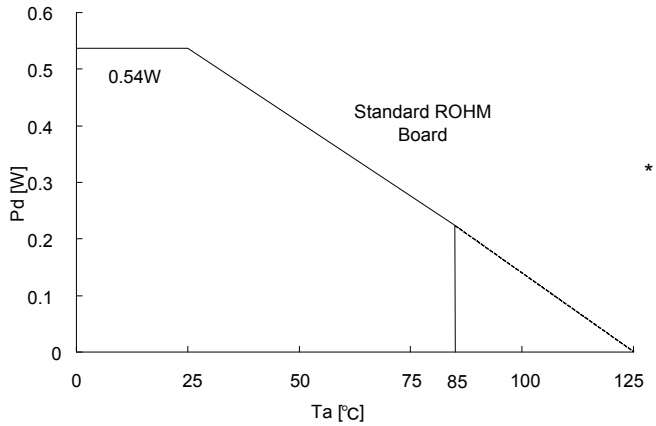
As for power dissipation, an approximate estimate of the heat reduction characteristics and internal power consumption of IC are shown, so please use these for reference. Since power dissipation changes substantially depending on the implementation conditions (board size, board thickness, metal wiring 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
Layout of Board for Measurement IC Implementation Position		 Top Layer (Top View)  Bottom Layer (Top View)
Measurement State		With board implemented (Wind speed 0 m/s)
Board Material		Glass epoxy resin (Double-side board)
Board Size		70 mm x 70 mm x 1.6 mm
Wiring Rate	Top layer	Metal (GND) wiring rate: Approx. 0%
	Bottom layer	Metal (GND) wiring rate: Approx. 50%
Through Hole		Diameter 0.5mm x 6 holes
Power Dissipation		0.54W
Thermal Resistance		θja=185.2℃/W



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

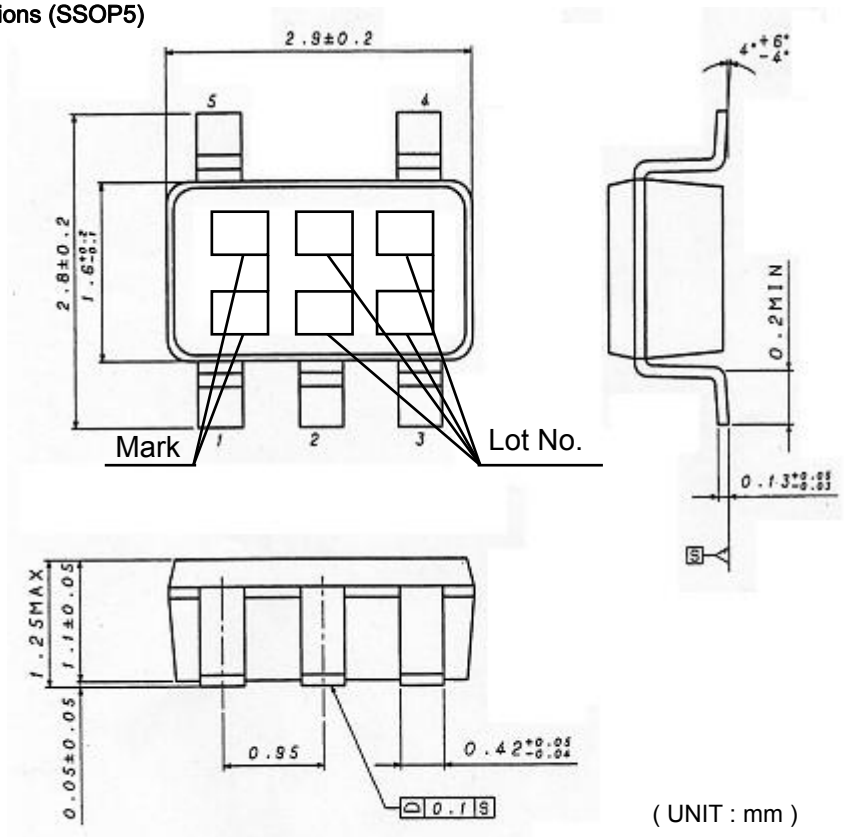
Fig.287. SSOP5 Power dissipation heat reduction characteristics (Reference)

●Device Name and Marking

Device Name: BUXXTD3WG
a

Symbol	Description		Marking
	XX	Output Voltage	
a	10	1.0V typ.	F0
	12	1.2V typ.	F1
	15	1.5V typ.	F2
	18	1.8V typ.	F3
	1J	1.85V typ.	F4
	19	1.9V typ.	F5
	20	2.0V typ.	F6
	21	2.1V typ.	F7
	25	2.5V typ.	F8
	26	2.6V typ.	F9
	27	2.7V typ.	G0
	28	2.8V typ.	G1
	2J	2.85V typ.	G2
	29	2.9V typ.	G3
	30	3.0V typ.	G4
	31	3.1V typ.	G5
	32	3.2V typ.	G6
	33	3.3V typ.	G7
	34	3.4V typ.	G8

●Package dimensions (SSOP5)



(UNIT : mm)

Fig.288. Package dimensions

●Other notes

- About absolute maximum rating
  Breakage may occur when absolute maximum ratings such as applied voltage and operating temperature range are exceeded. Short mode or open mode cannot be specified at occurrence of a break, so please prepare physical safety measures (e.g., fuse) if such special mode in which the absolute maximum rating is exceeded can be assumed.

- About GND potential
  Please be sure that the potential of the GND terminal is the lowest in any operating condition.

- About thermal design
  Please provide thermal design with sufficient margin, taking power dissipation (Pd) in actual usage conditions into consideration.

- About short between pins and misattachment
  Please be careful regarding the IC direction and misalignment at attachment onto a printed circuit board. Misattachment may cause a break of IC. Short caused by foreign matter between outputs, output and power supply, or GNDs may also lead to a break.

- About operation in a strong electromagnetic field
  Please note that usage in a strong electromagnetic field may cause malfunction.

- About common impedance
  Please give due consideration to wiring of the power source and GND by reducing common-mode ripple or making ripple as small as possible (e.g., making the wiring as thick and short as possible, or reducing ripple by L·C), etc.

- About STBY terminal voltage
  Set STBY terminal voltage to 0.3 V or less to put each channel into a standby state and to 1.2 V or more to put each channel into an operating state. Do not fix STBY terminal voltage to 0.3 V or more and 1.2 V or less or do not lengthen the transition time. This may cause malfunction or failure. When shorting the VIN terminal and STBY terminal for usage, the status will be “STBY=VIN＝LOW” at turning the power OFF, and discharge of the VOUT terminal cannot operate, which means voltage may remain for a certain time in the VOUT terminal. Since turning the power ON again in this state may cause overshoot, turn the power ON for use after the VOUT terminal is completely discharged.

- About over current protection circuit
  Output has a built-in over current protection circuit, which prevents IC break at load short. Note that this protection circuit is effective for prevention of breaks due to unexpected accidents. Please avoid usage by which the protection circuit operates continuously.

- About thermal shutdown
  Output is OFF when the thermal circuit operates since a temperature protection circuit is built in to prevent thermal breakdown. However, it recovers when the temperature returns to a certain temperature. The thermal circuit operates at emergency such as overheating of IC. Since it is prepared to prevent IC breakdown, please do not use it in a state in which protection works.

● About reverse current

For applications on which reverse current is assumed to flow into IC, it is recommended to prepare a path to let the current out by putting a bypass diode between the VIN-VOUT terminals.

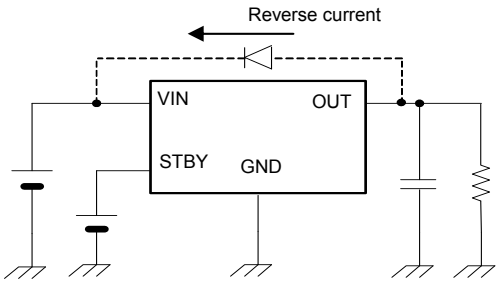


Fig.289. Example of bypass diode connection

● About testing on a set board

When connecting a capacitor to a terminal with low impedance for testing on a set board, please be sure to discharge for each process since IC may be stressed. As a countermeasure against static electricity, prepare grounding in the assembly process and take sufficient care in transportation and storage. In addition, when connecting a capacitor to a jig in a testing process, please do so after turning the power OFF and remove it after turning the power OFF.

●Ordering part number

B	U	1	0	T	D	3	W	G	-	T	R

ROHM type

Output voltage

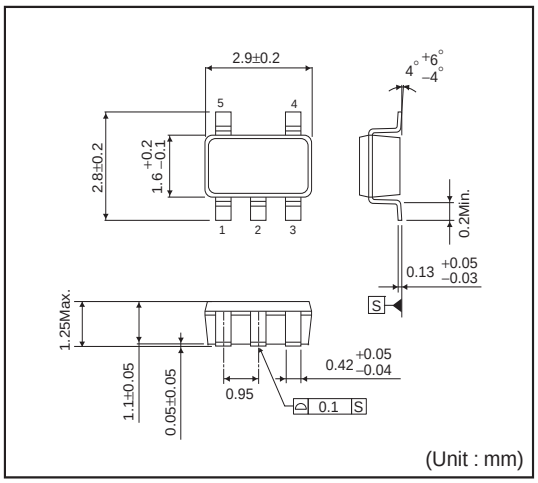
10 : 1.0V	27 : 2.7V
12 : 1.2V	28 : 2.8V
15 : 1.5V	2J : 2.85V
18 : 1.8V	29 : 2.9V
1J : 1.85V	30 : 3.0V
19 : 1.9V	31 : 3.1V
20 : 2.0V	32 : 3.2V
21 : 2.1V	33 : 3.3V
25 : 2.5V	34 : 3.4V
26 : 2.6V	

Series

Package
G: SSOP5

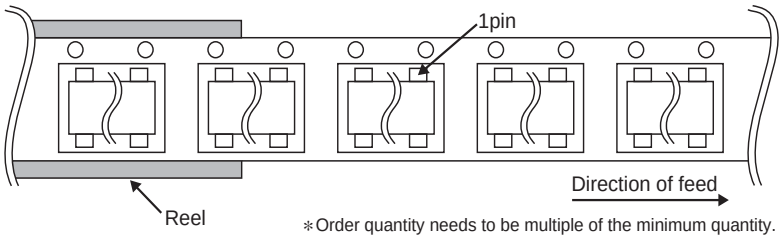
Packaging and forming specification
TR : Embossed tape and reel

SSOP5



<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	3000pcs
Direction of feed	TR (The direction is the 1pin of product is at the upper right when you hold reel on the left hand and you pull out the tape on the right hand)



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

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