Linear Regulator Series

BA178Mxx Series Typical Performance Curves

No.AEK59-D1-0244-0

LIST

BA178M05 (V_O = 5.0V)

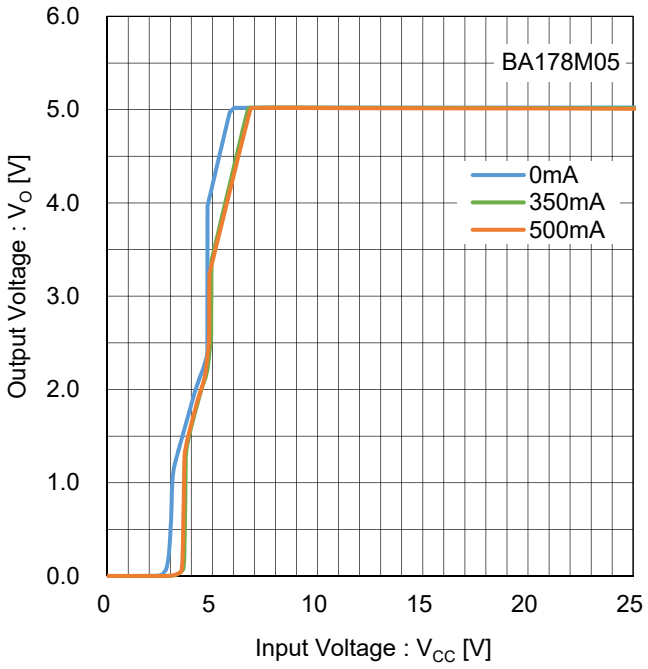


Figure 1. Output Voltage vs Input Voltage
Test Circuit A

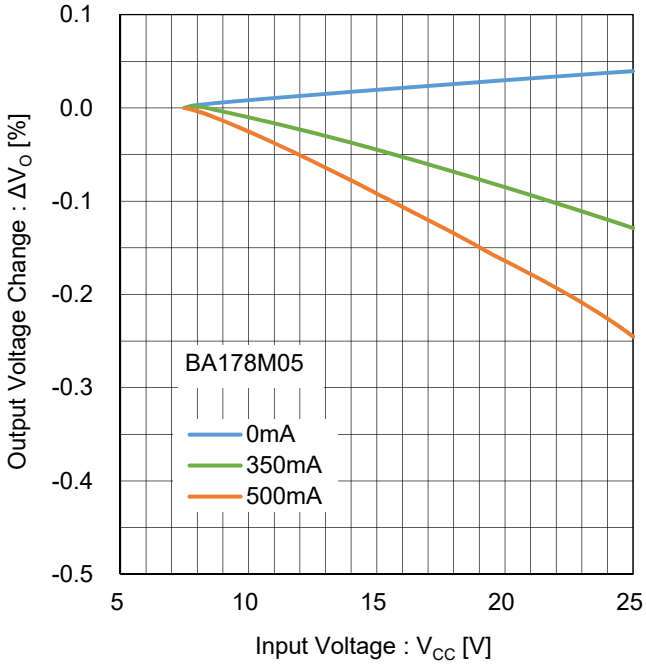


Figure 2. Line Regulation
Test Circuit B

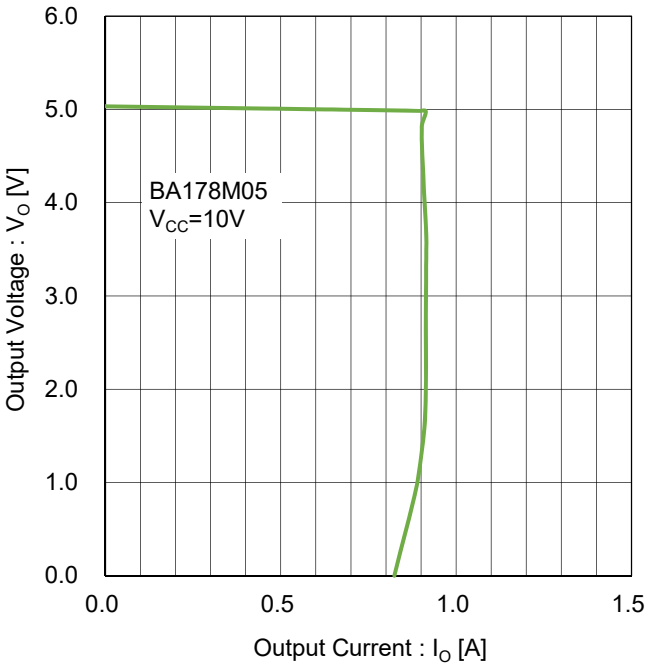


Figure 3. Overcurrent Protection
Test Circuit C

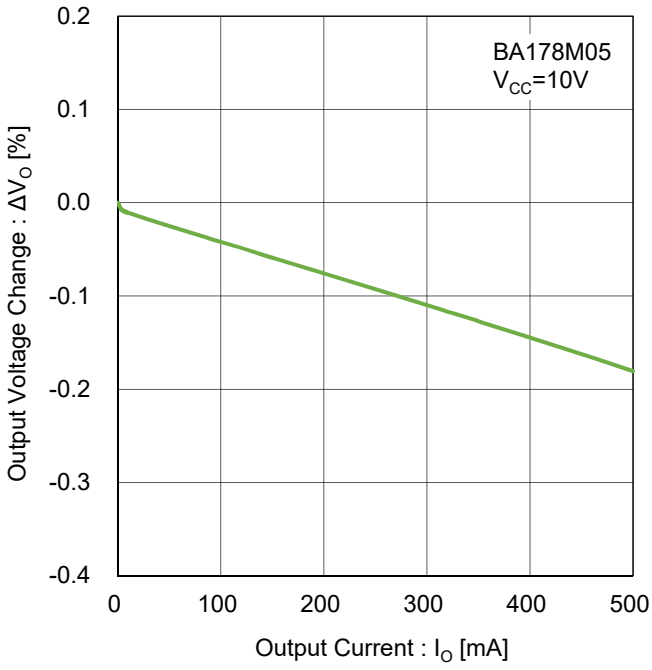


Figure 4. Load Regulation
Test Circuit D

BA178M05 (V_O = 5.0V)

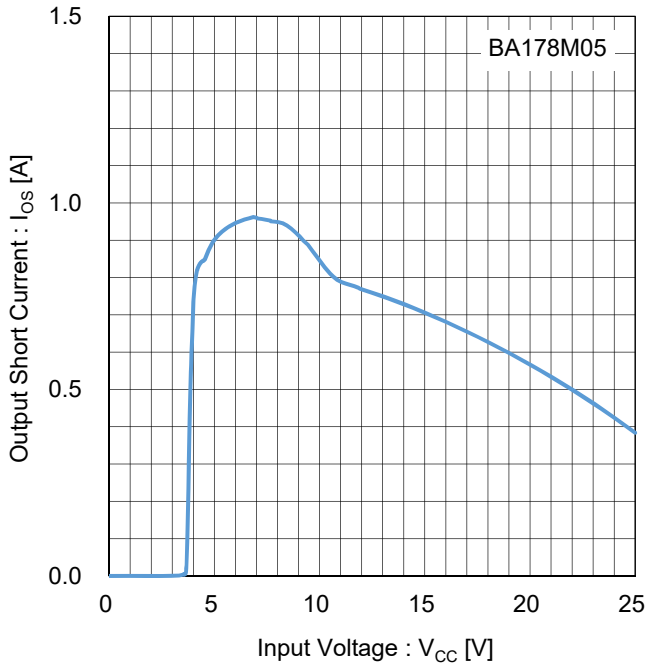


Figure 5. Output Short Current vs Input Voltage
Test Circuit E

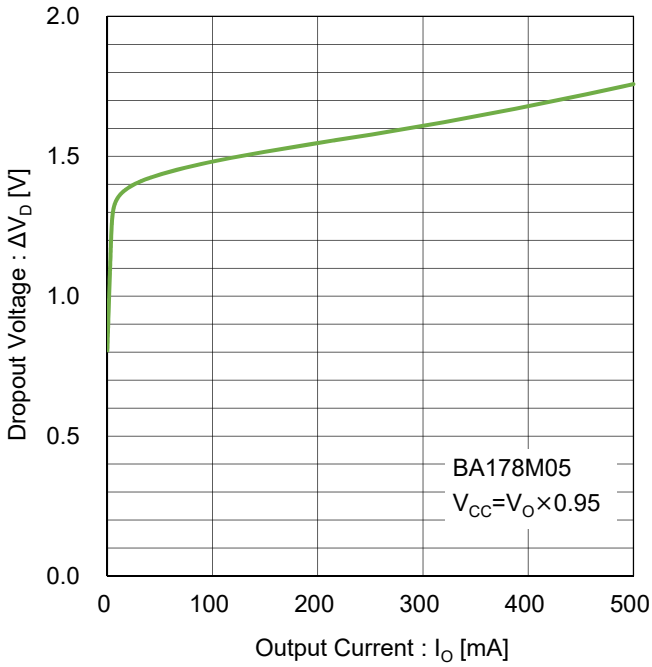


Figure 6. Dropout Voltage vs Output Current
Test Circuit F

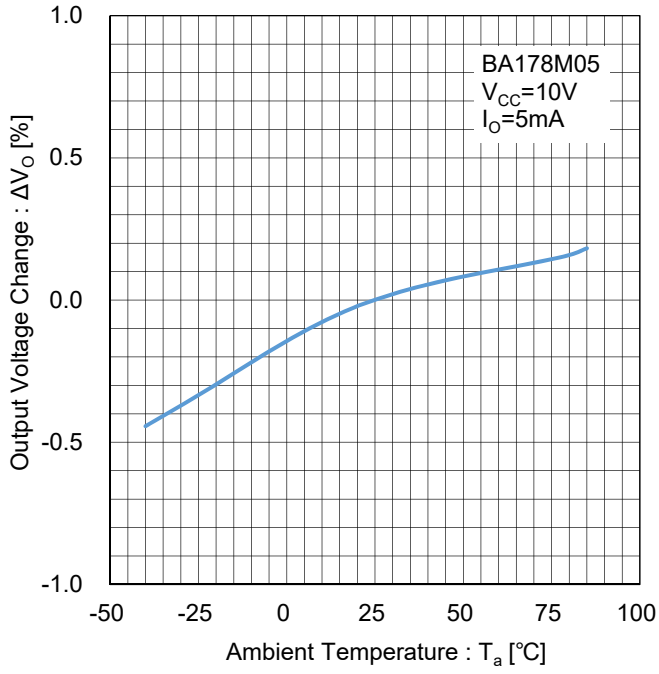


Figure 7. Output Voltage Temperature Stability
Test Circuit G

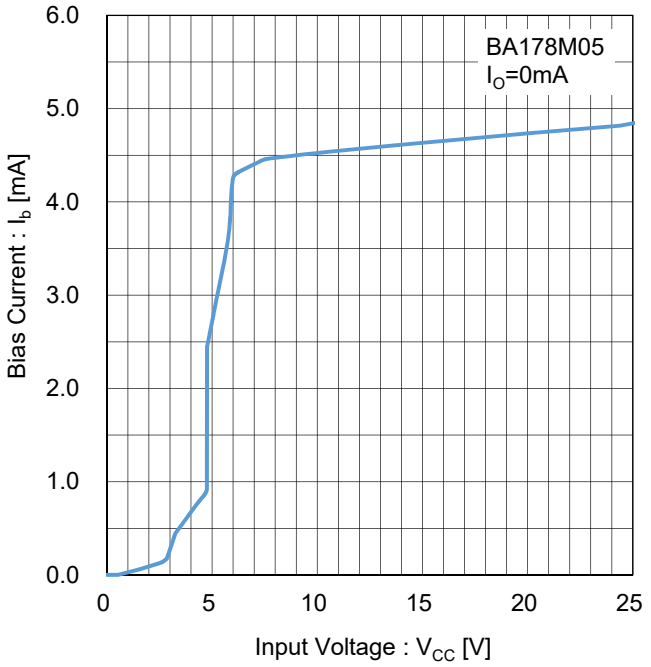


Figure 8. Bias Current vs Input Voltage
Test Circuit H

BA178M05 (V_O = 5.0V)

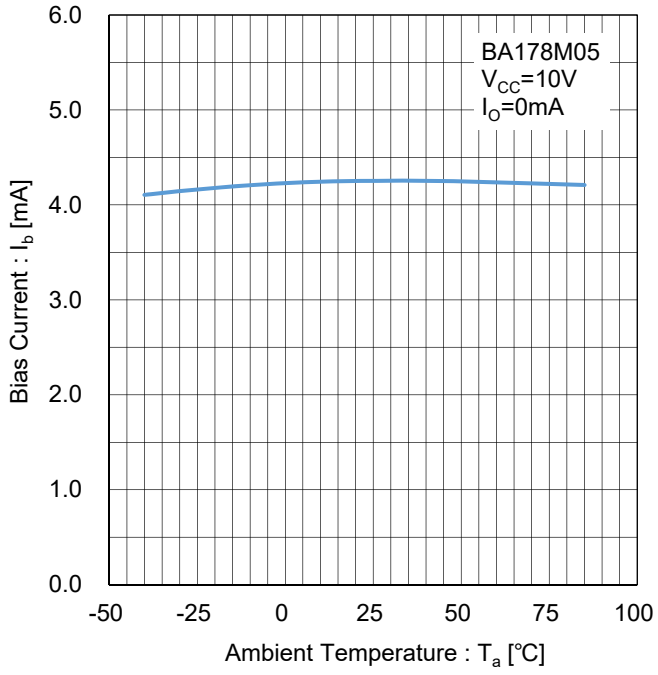


Figure 9. Bias Current vs Temperature
Test Circuit I

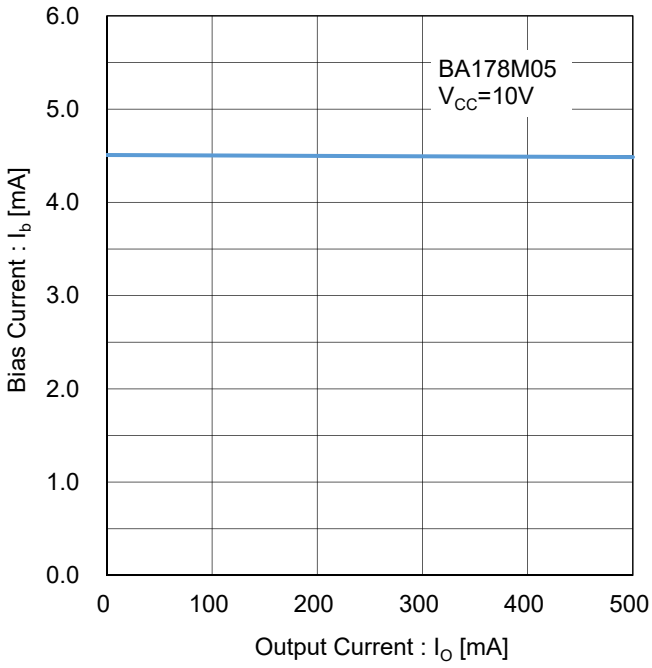


Figure 10. Bias Current vs Output Current
Test Circuit J

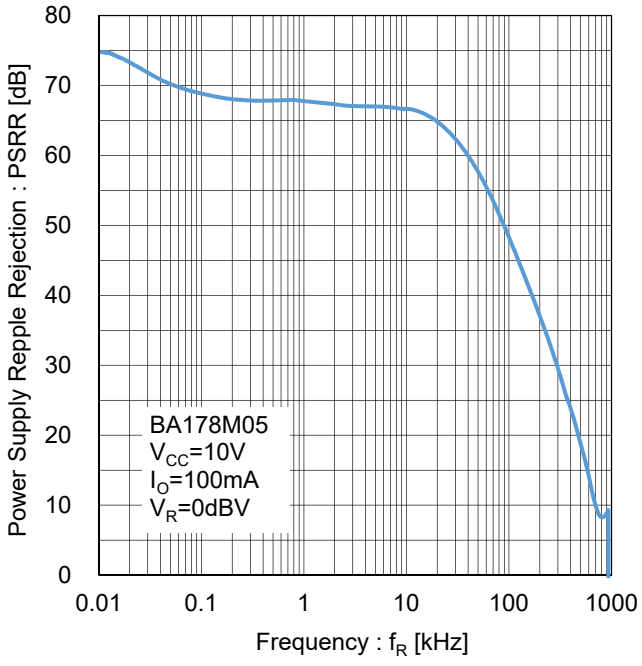


Figure 11. Ripple Rejection
Test Circuit K

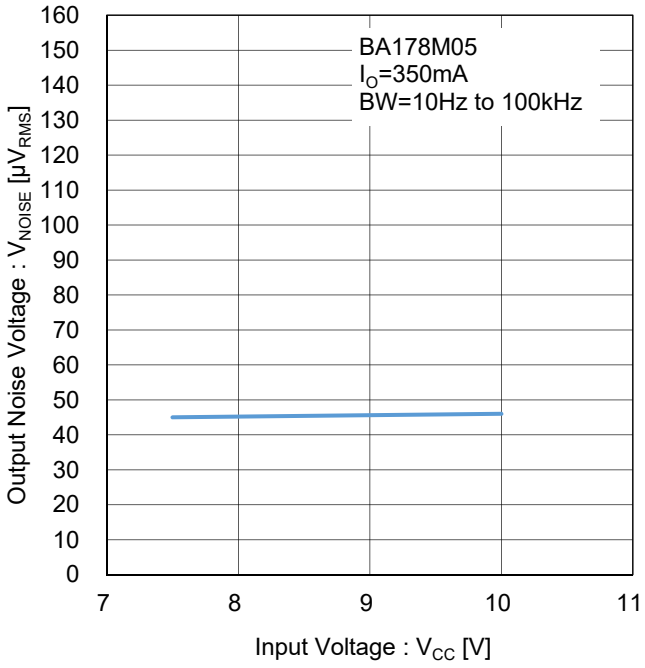


Figure 12. Output Noise Voltage
Test Circuit L

BA178M06 (V_O = 6.0V)

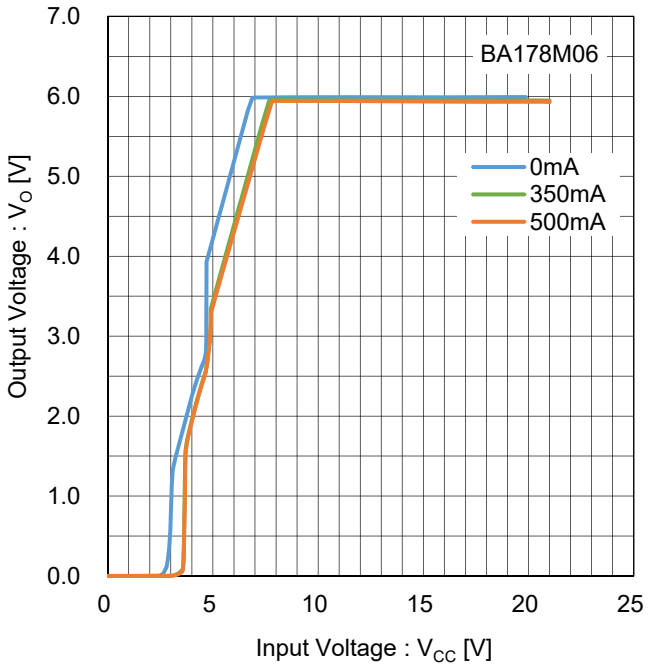


Figure 13. Output Voltage vs Input Voltage
Test Circuit A

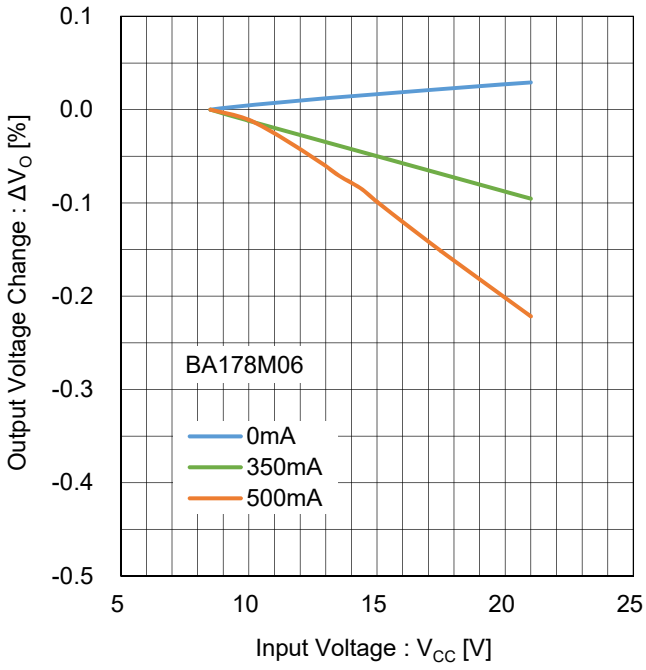


Figure 14. Line Regulation
Test Circuit B

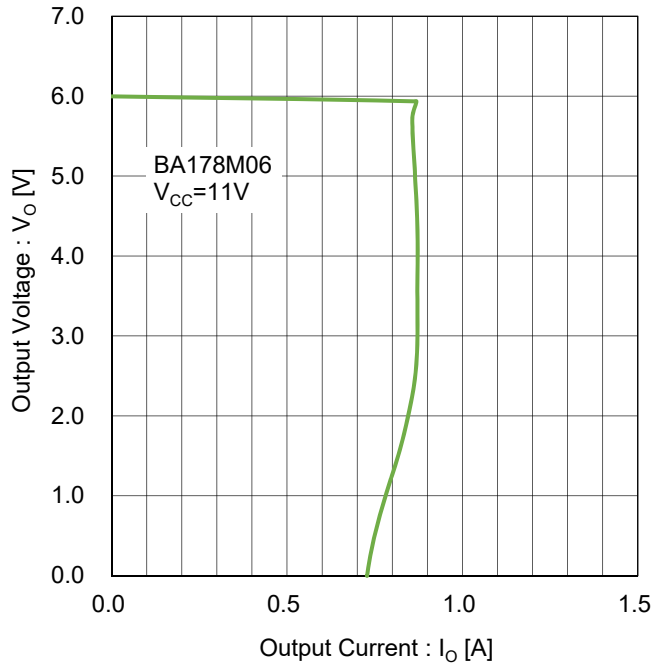


Figure 15. Overcurrent Protection
Test Circuit C

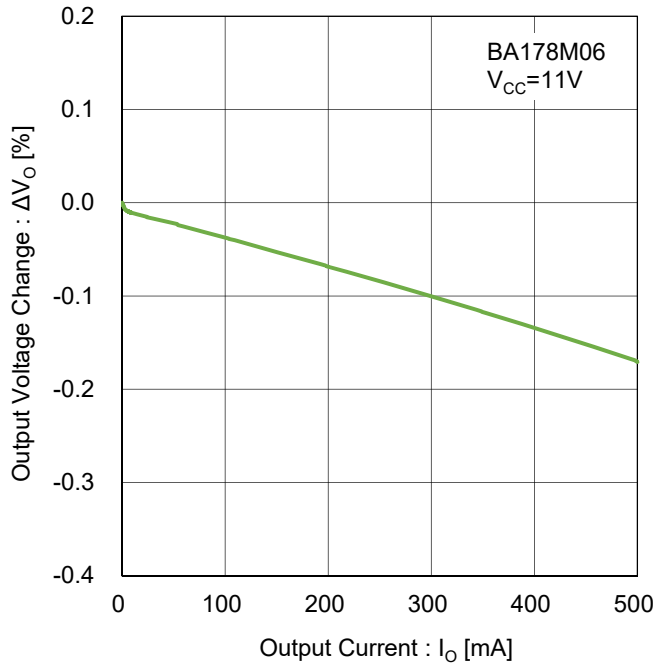


Figure 16. Load Regulation
Test Circuit D

BA178M06 (V_O = 6.0V)

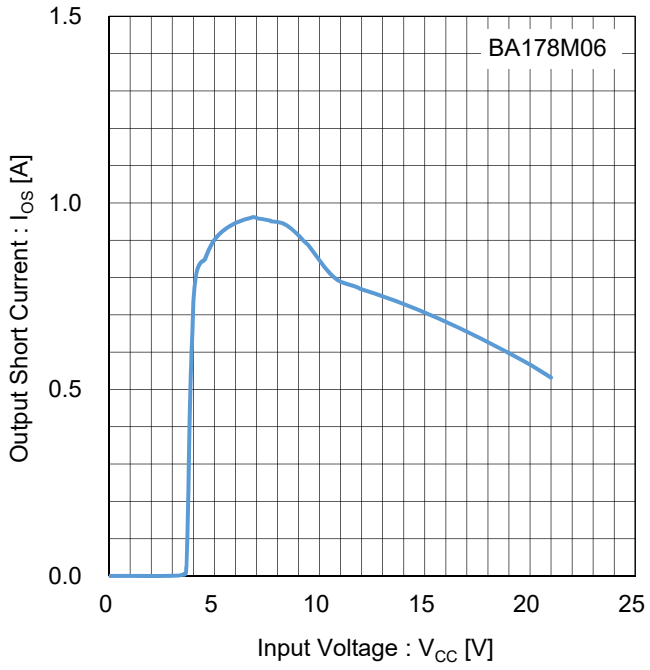


Figure 17. Output Short Current vs Input Voltage
Test Circuit E

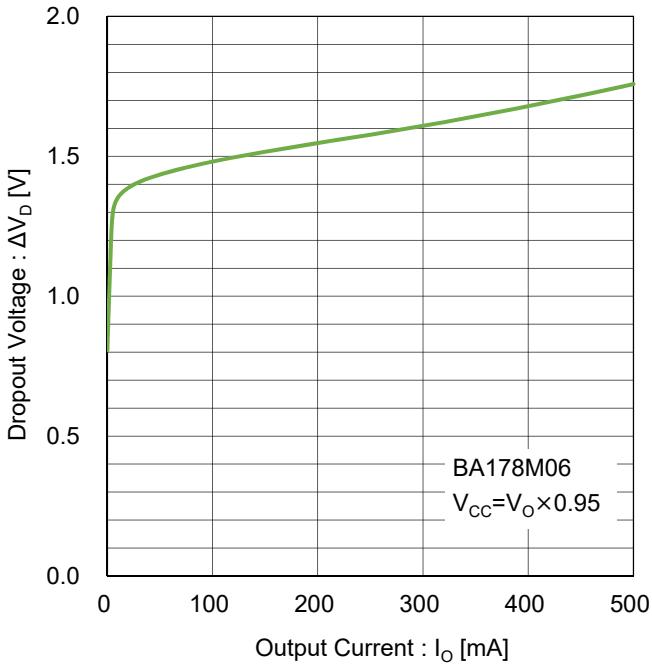


Figure 18. Dropout Voltage vs Output Current
Test Circuit F

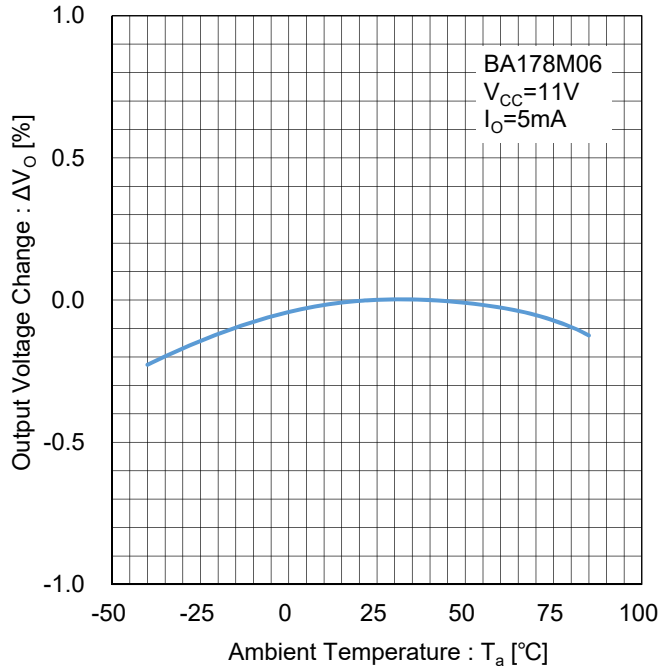


Figure 19. Output Voltage Temperature Stability
Test Circuit G

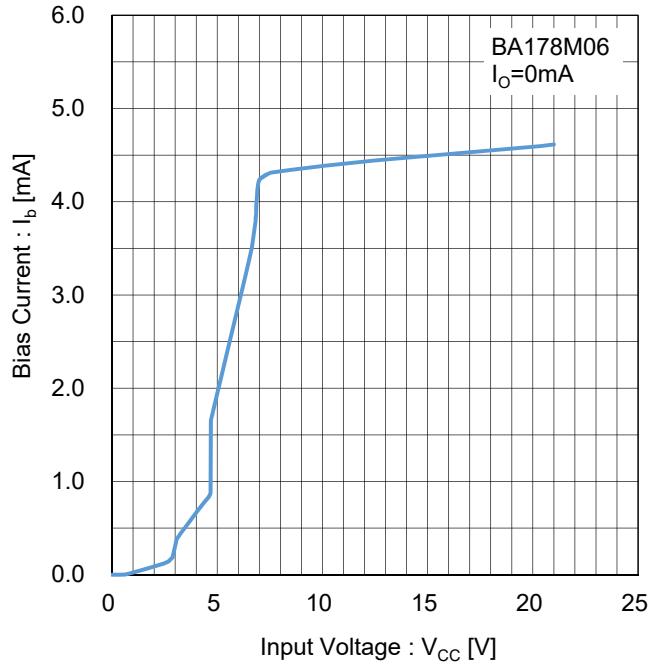


Figure 20. Bias Current vs Input Voltage
Test Circuit H

BA178M06 (V_O = 6.0V)

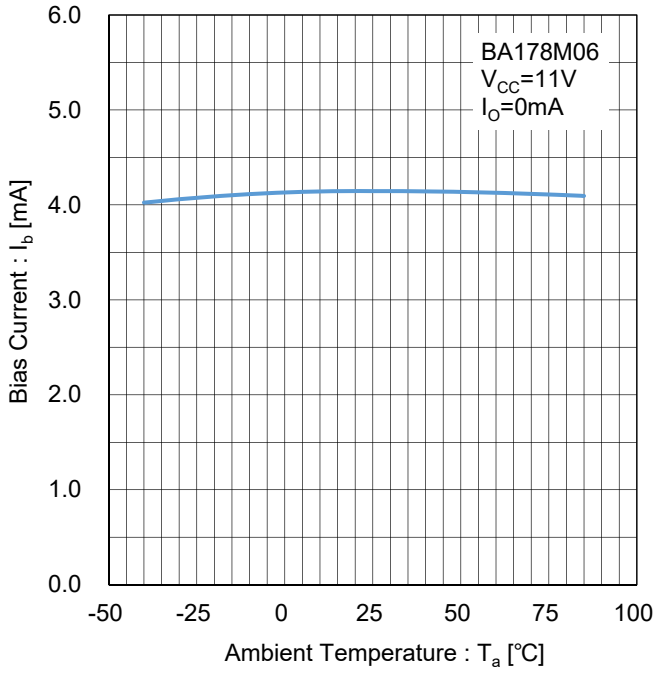


Figure 21. Bias Current vs Temperature
Test Circuit I

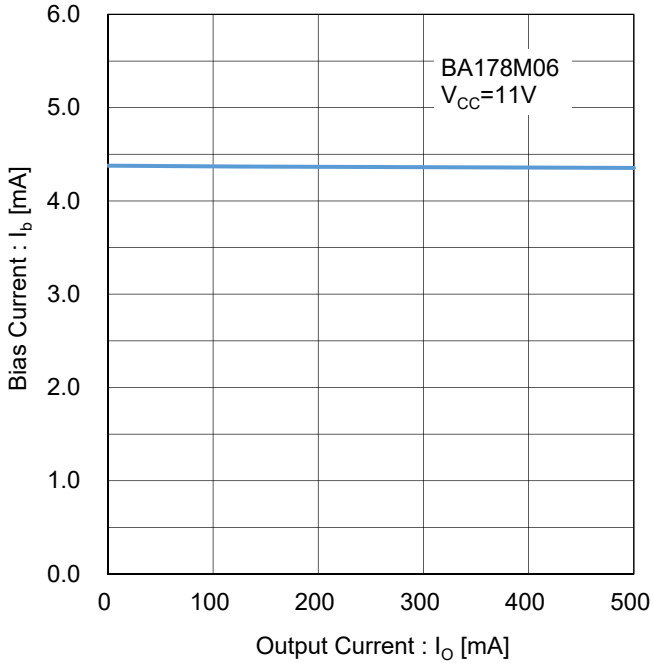


Figure 22. Bias Current vs Output Current
Test Circuit J

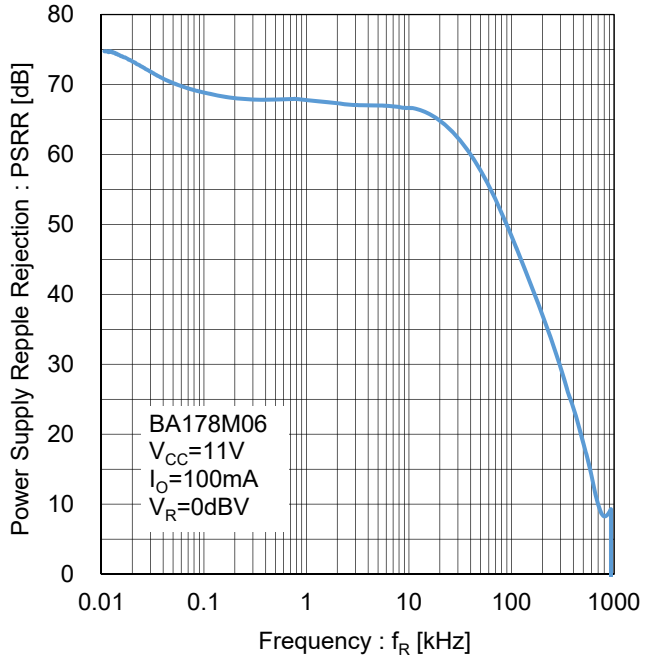


Figure 23. Ripple Rejection
Test Circuit K

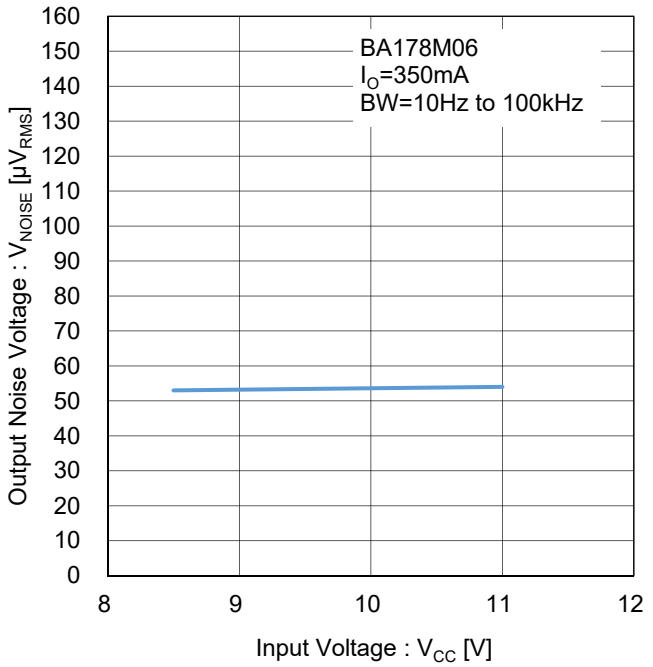


Figure 24. Output Noise Voltage
Test Circuit L

BA178M07 (V_O = 7.0V)

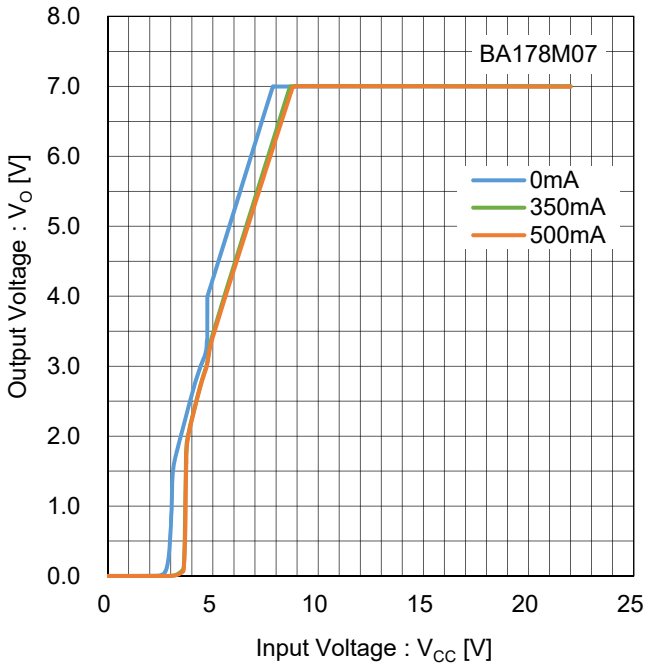


Figure 25. Output Voltage vs Input Voltage
Test Circuit A

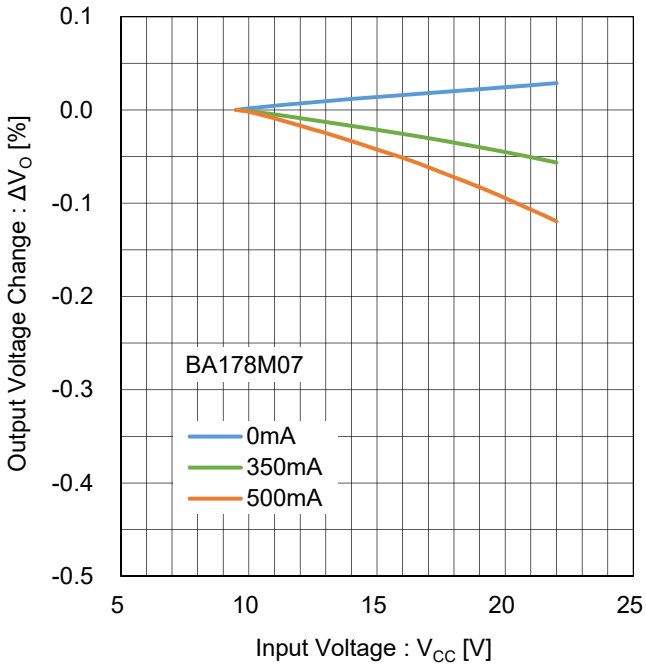


Figure 26. Line Regulation
Test Circuit B

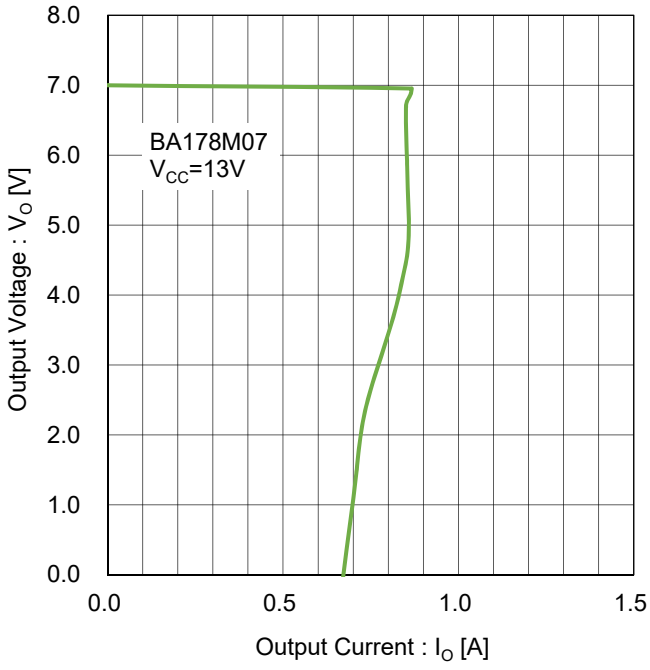


Figure 27. Overcurrent Protection
Test Circuit C

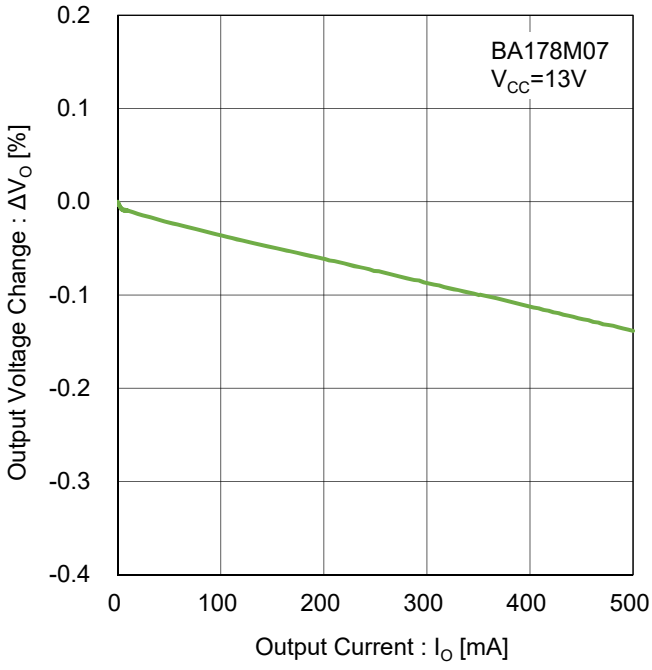


Figure 28. Load Regulation
Test Circuit D

BA178M07 (V_O = 7.0V)

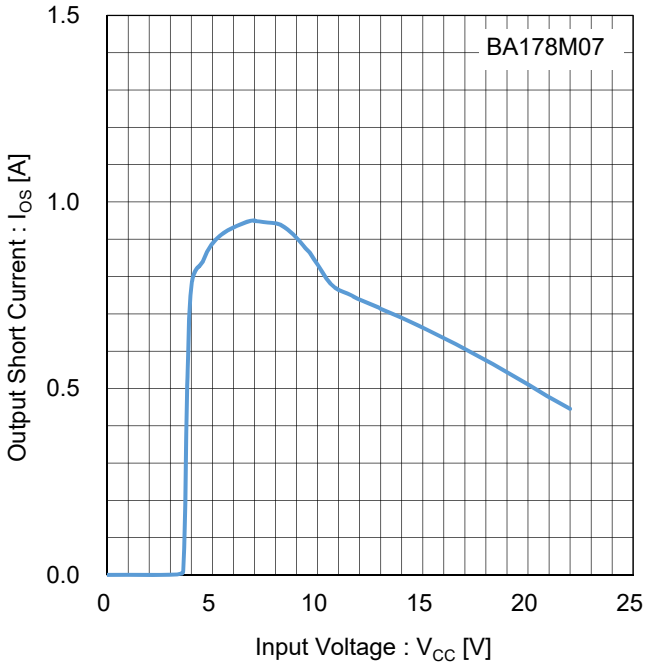


Figure 29. Output Short Current vs Input Voltage
Test Circuit E

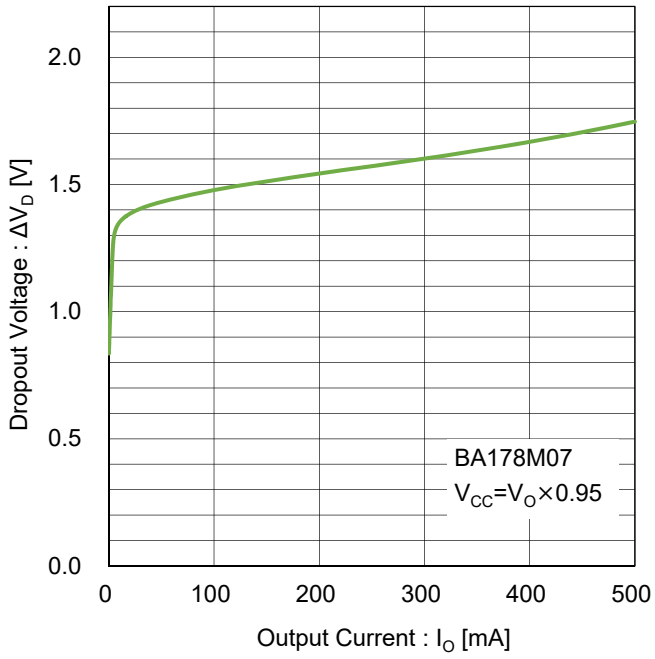


Figure 30. Dropout Voltage vs Output Current
Test Circuit F

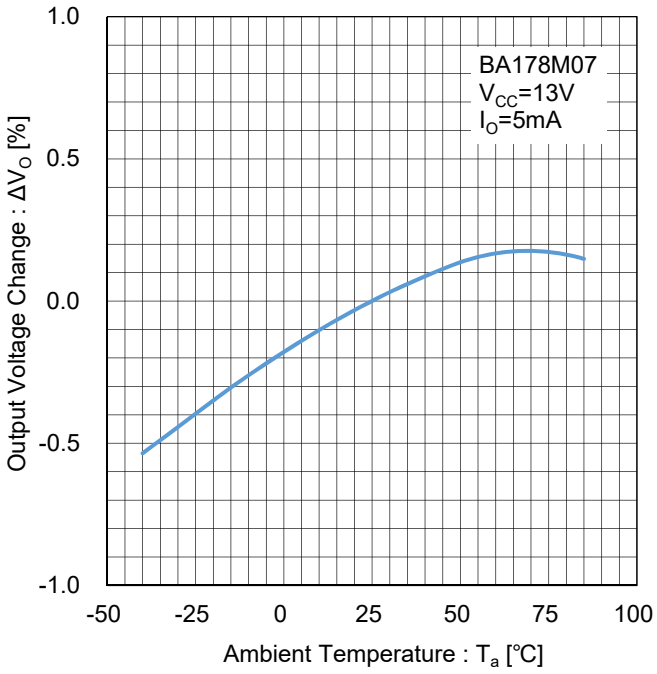


Figure 31. Output Voltage Temperature Stability
Test Circuit G

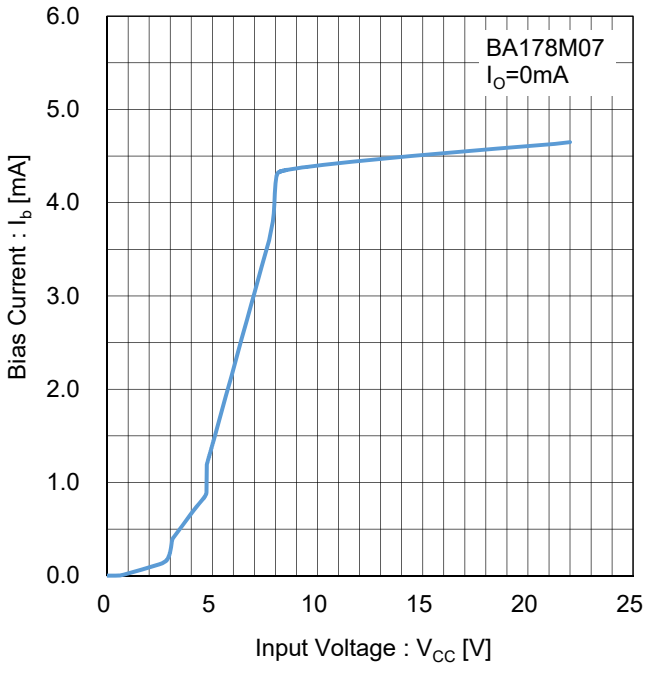


Figure 32. Bias Current vs Input Voltage
Test Circuit H

BA178M07 (V_O = 7.0V)

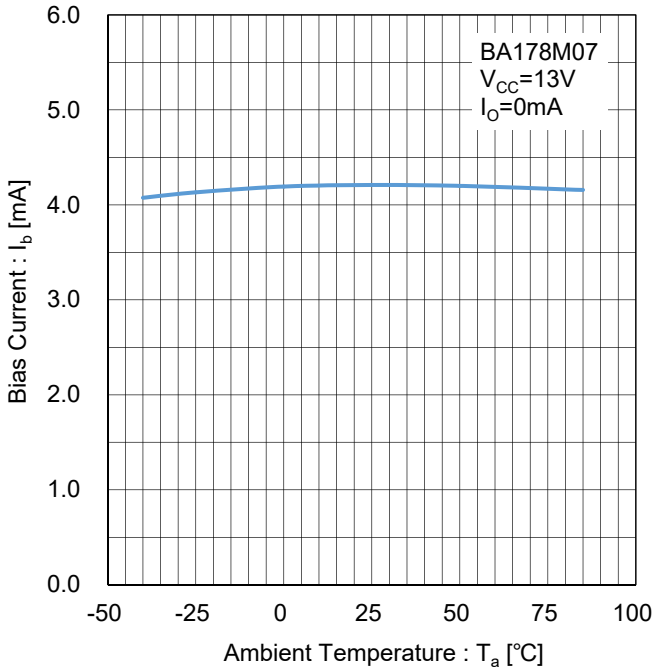


Figure 33. Bias Current vs Temperature
Test Circuit I

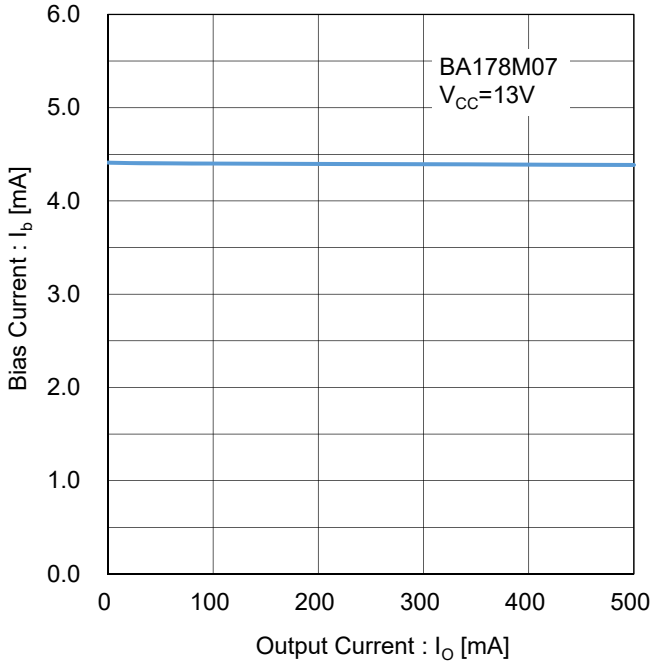


Figure 34. Bias Current vs Output Current
Test Circuit J

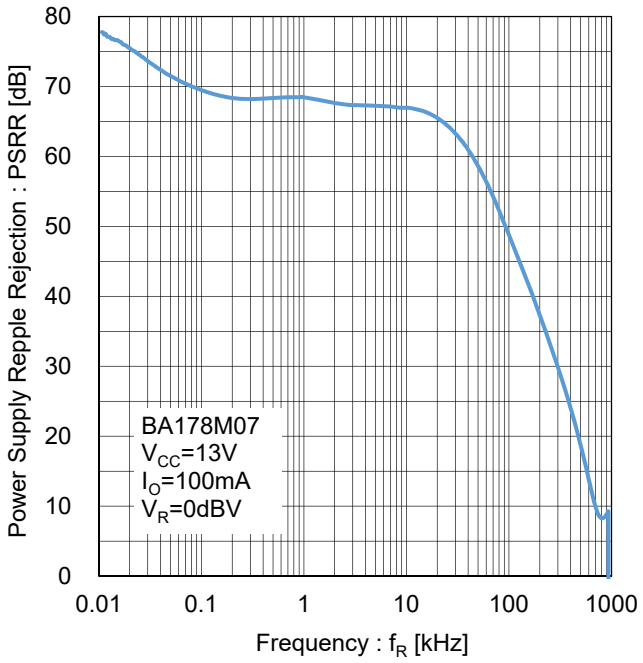


Figure 35. Ripple Rejection
Test Circuit K

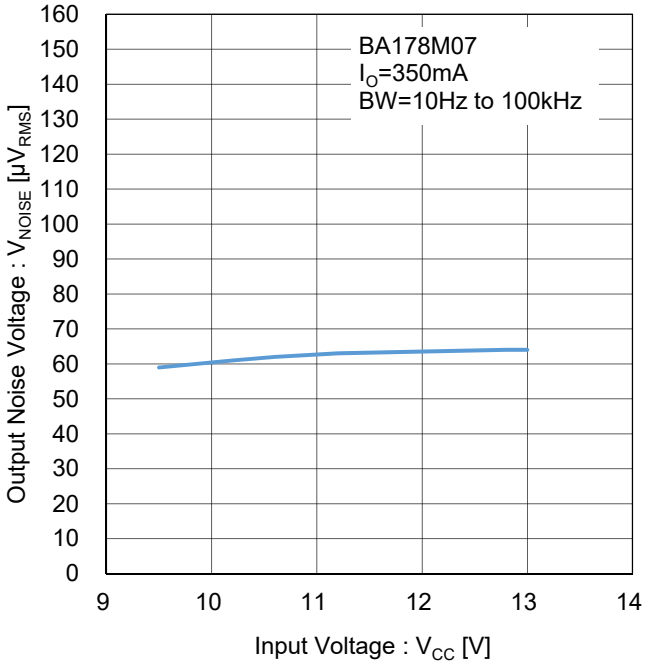


Figure 36. Output Noise Voltage
Test Circuit L

BA178M08 (V_O = 8.0V)

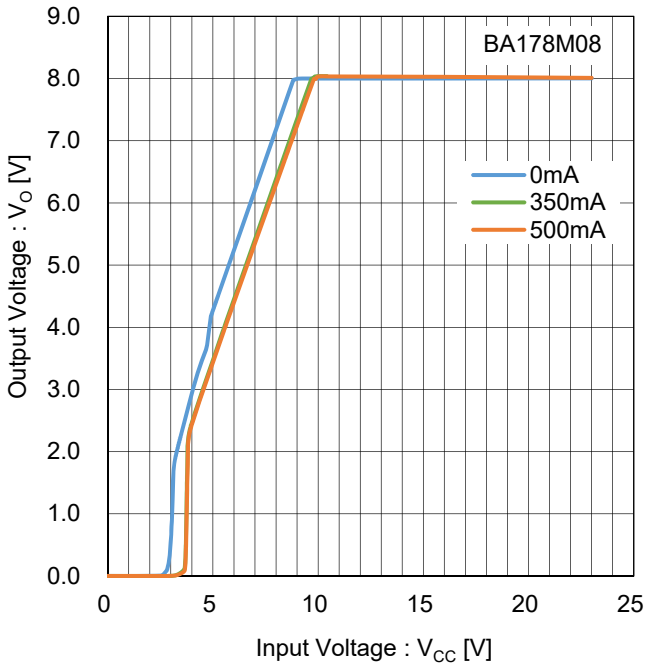


Figure 37. Output Voltage vs Input Voltage
Test Circuit A

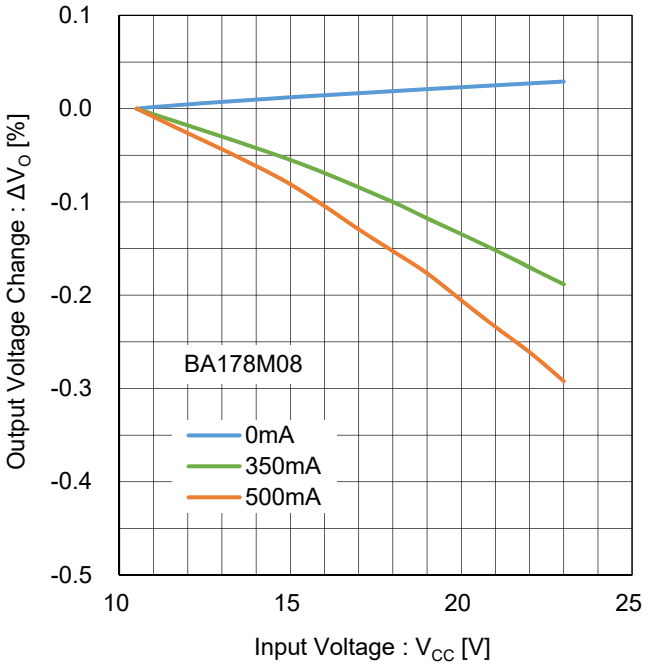


Figure 38. Line Regulation
Test Circuit B

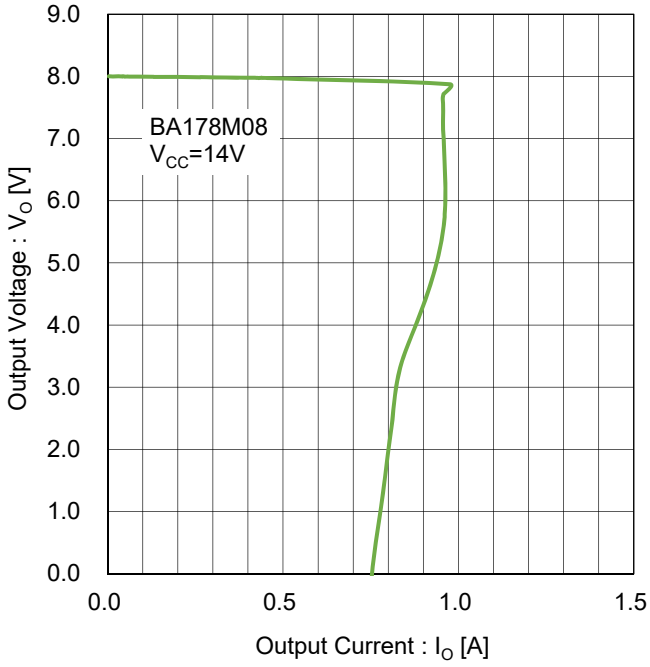


Figure 39. Overcurrent Protection
Test Circuit C

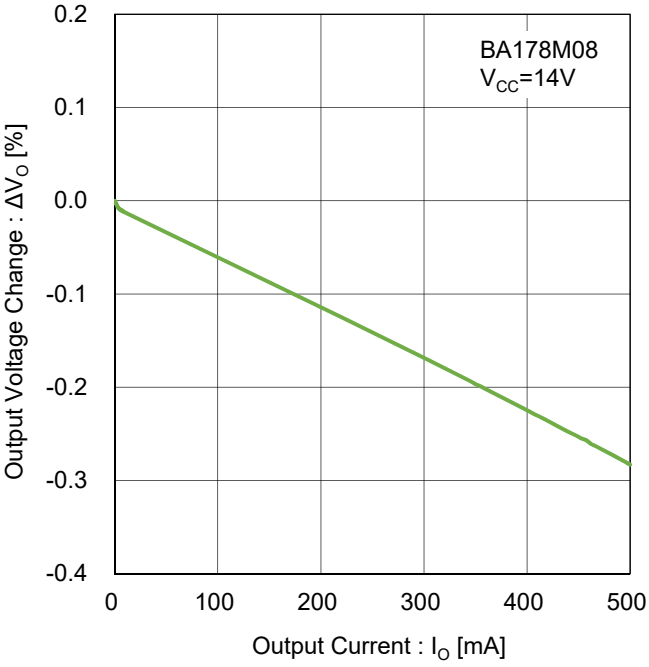


Figure 40. Load Regulation
Test Circuit D

BA178M08 (V_O = 8.0V)

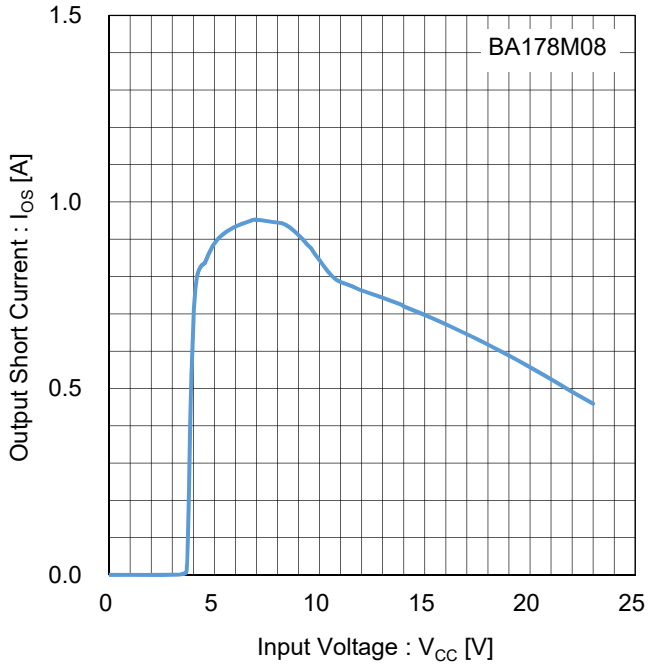


Figure 41. Output Short Current vs Input Voltage
Test Circuit E

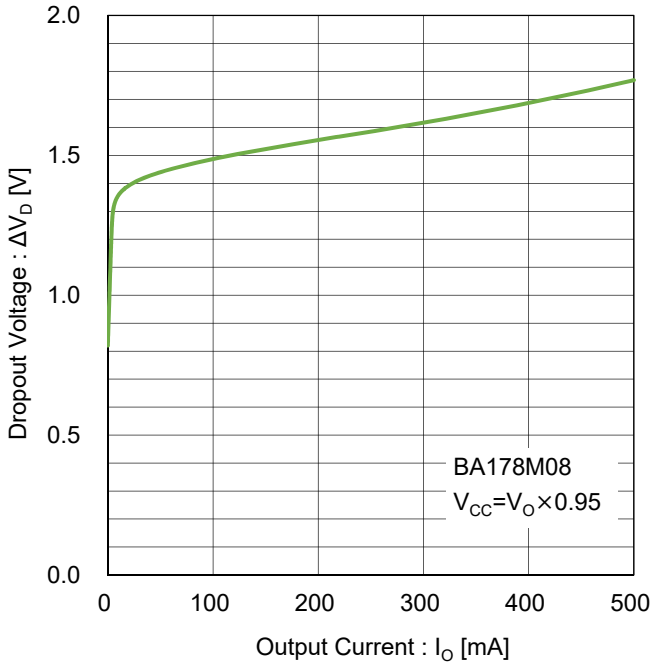


Figure 42. Dropout Voltage vs Output Current
Test Circuit F

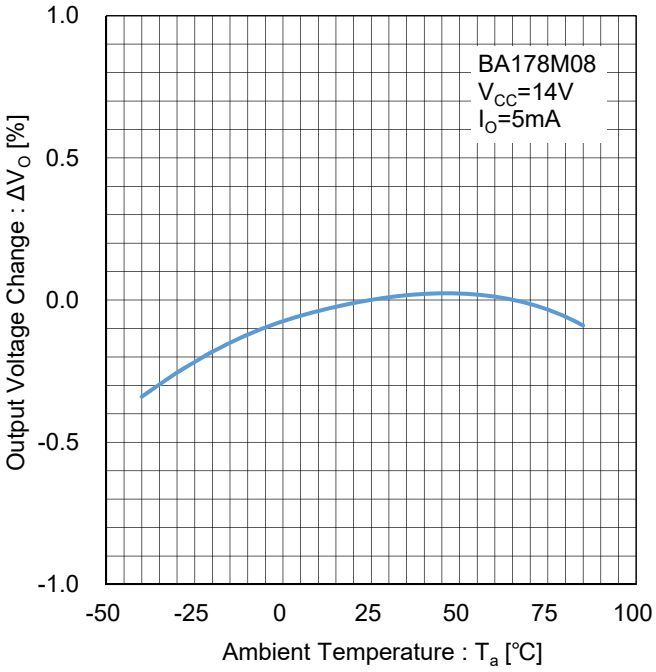


Figure 43. Output Voltage Temperature Stability
Test Circuit G

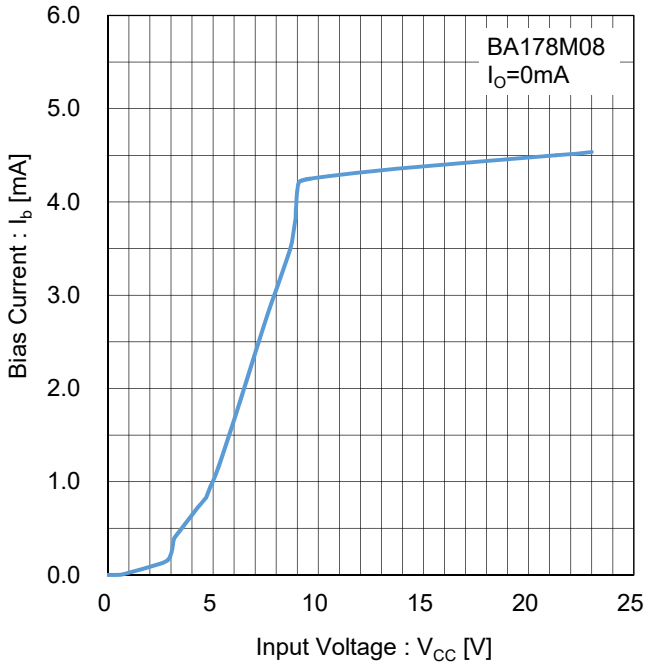


Figure 44. Bias Current vs Input Voltage
Test Circuit H

BA178M08 (V_O = 8.0V)

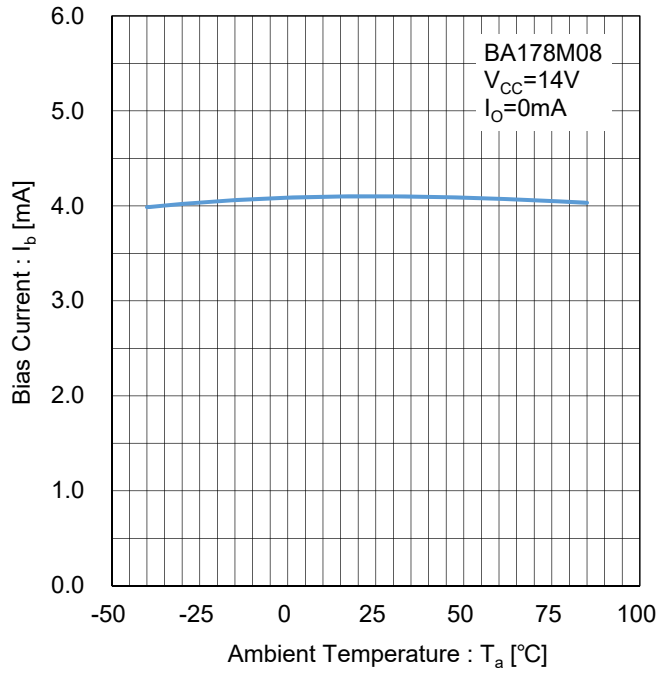


Figure 45. Bias Current vs Temperature
Test Circuit I

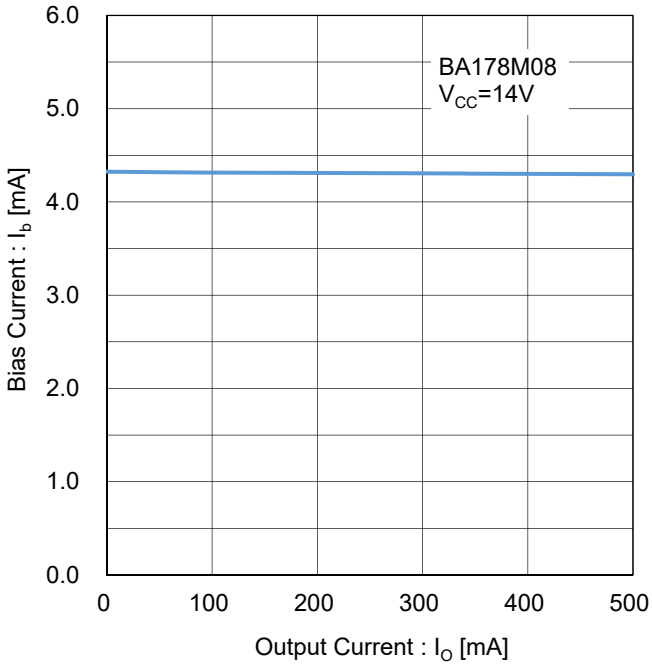


Figure 46. Bias Current vs Output Current
Test Circuit J

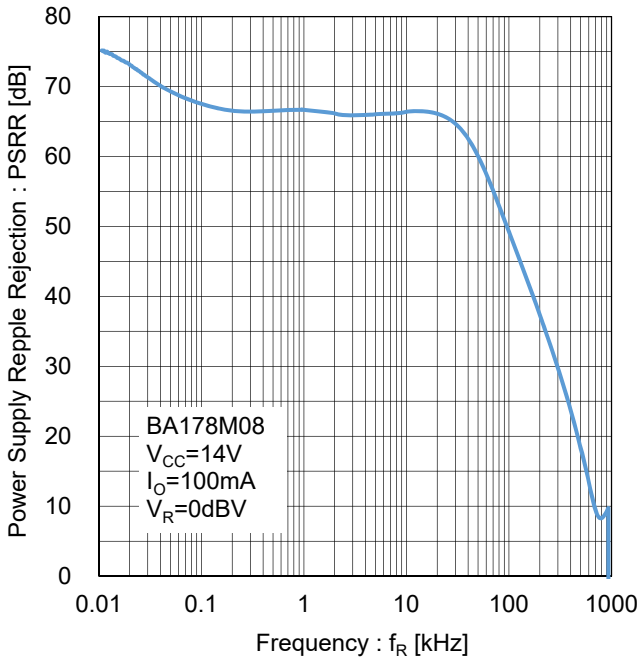


Figure 47. Ripple Rejection
Test Circuit K

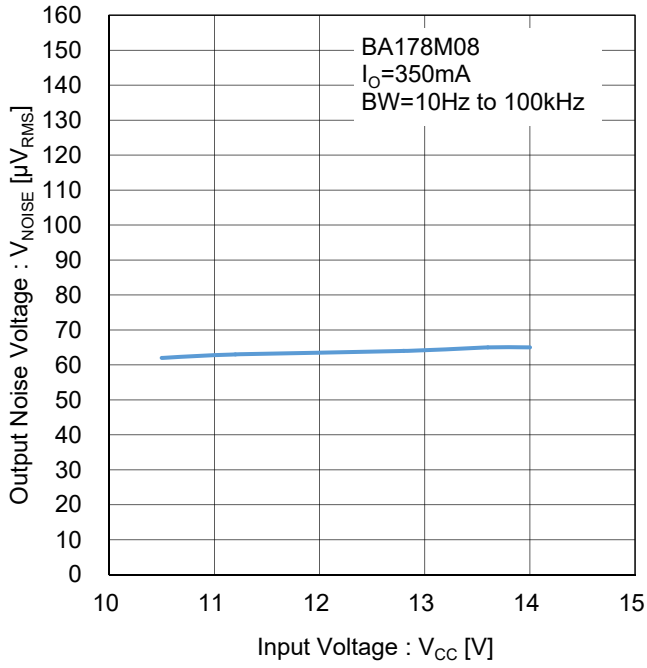


Figure 48. Output Noise Voltage
Test Circuit L

BA178M09 (V_O = 9.0V)

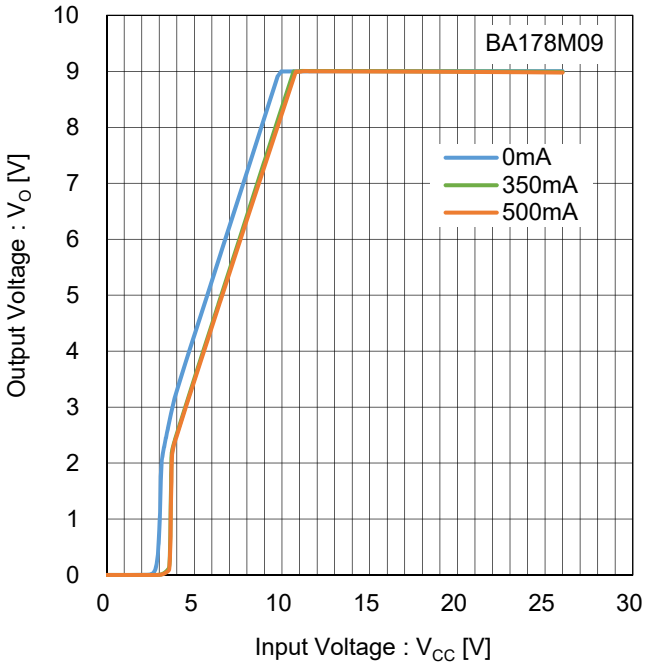


Figure 49. Output Voltage vs Input Voltage
Test Circuit A

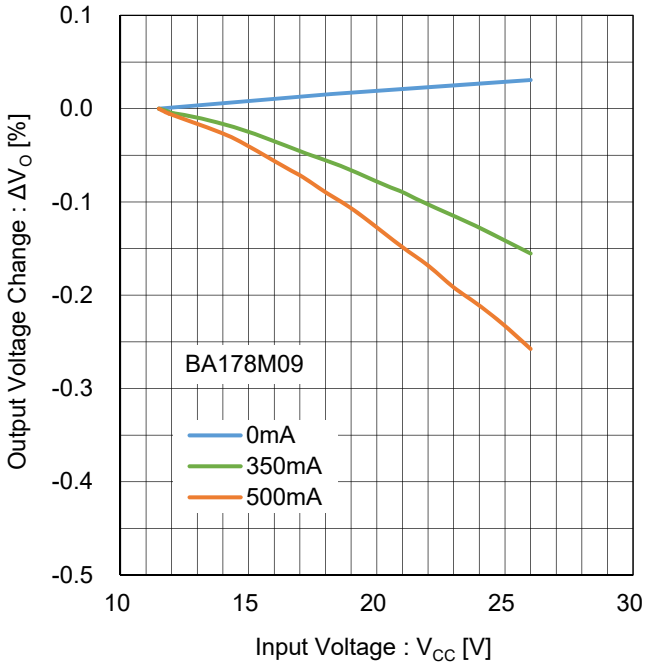


Figure 50. Line Regulation
Test Circuit B

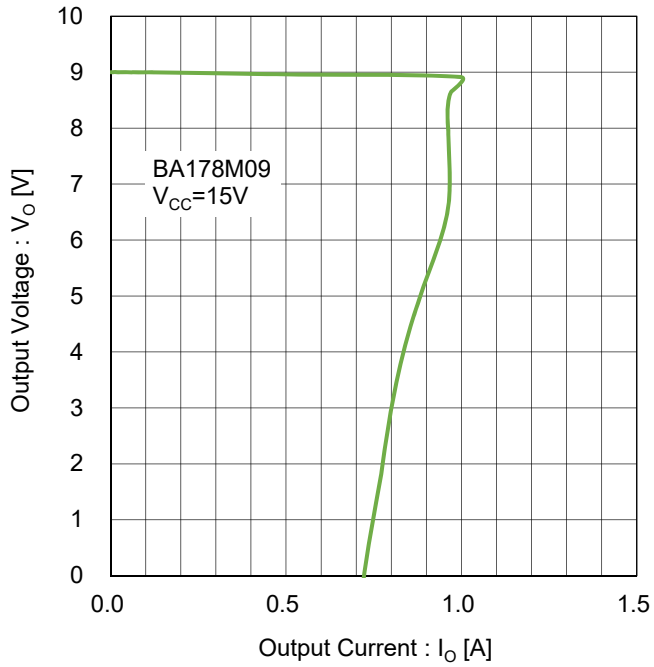


Figure 51. Overcurrent Protection
Test Circuit C

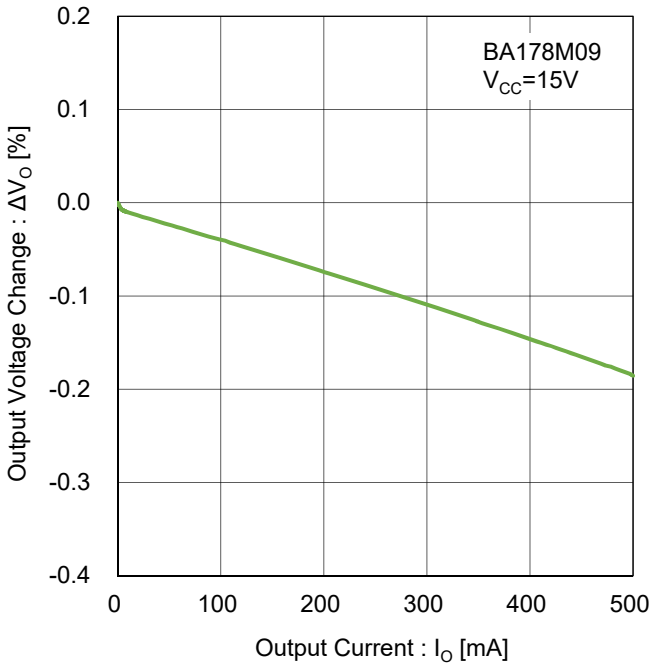


Figure 52. Load Regulation
Test Circuit D

BA178M09 (V_O = 9.0V)

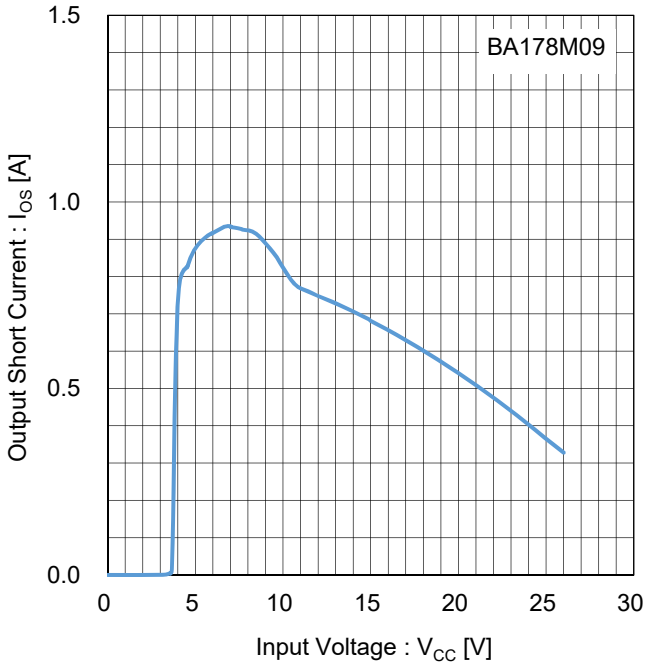


Figure 53. Output Short Current vs Input Voltage
Test Circuit E

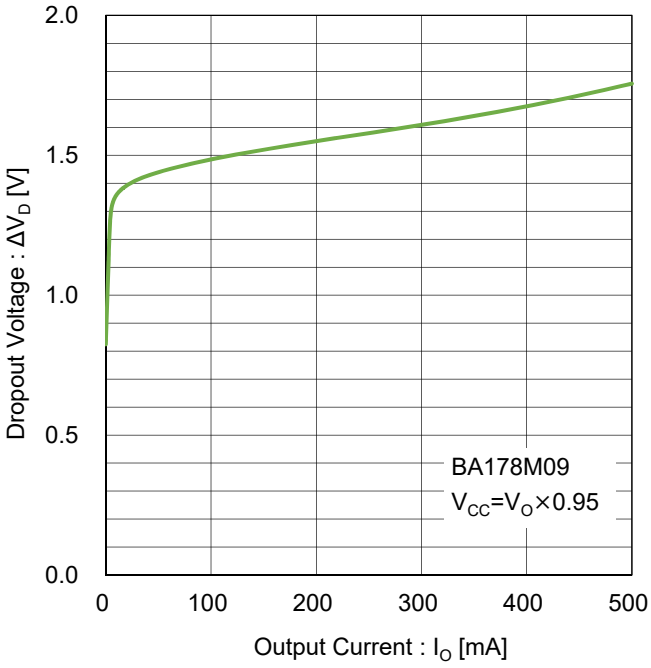


Figure 54. Dropout Voltage vs Output Current
Test Circuit F

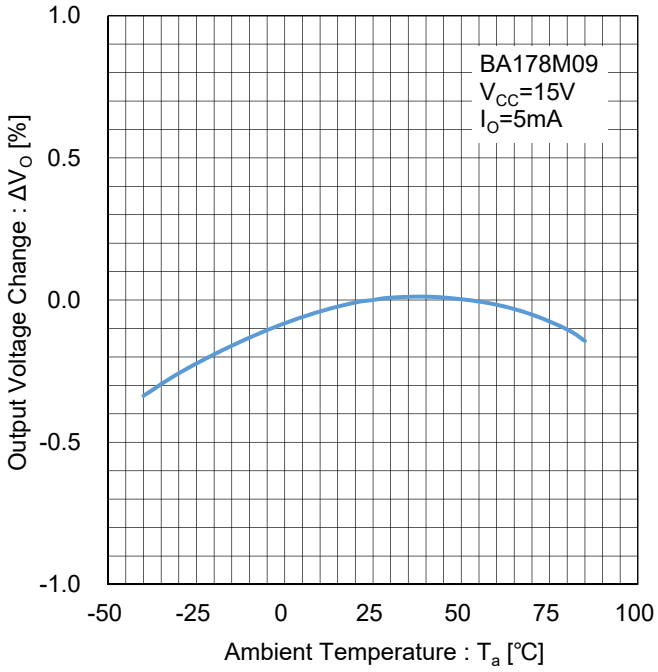


Figure 55. Output Voltage Temperature Stability
Test Circuit G

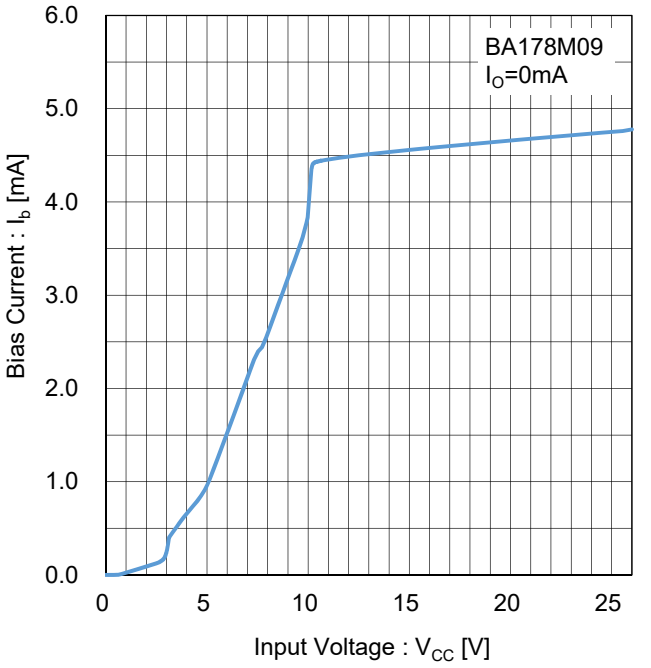


Figure 56. Bias Current vs Input Voltage
Test Circuit H

BA178M09 (V_O = 9.0V)

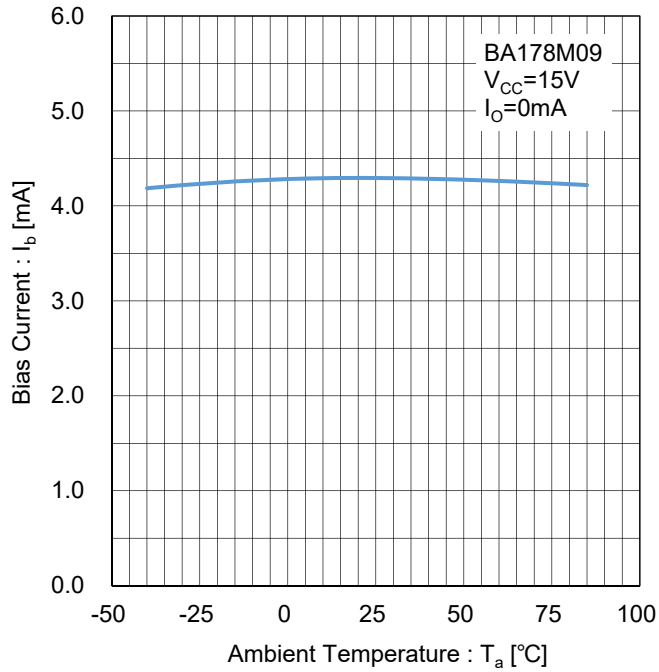


Figure 57. Bias Current vs Temperature
Test Circuit I

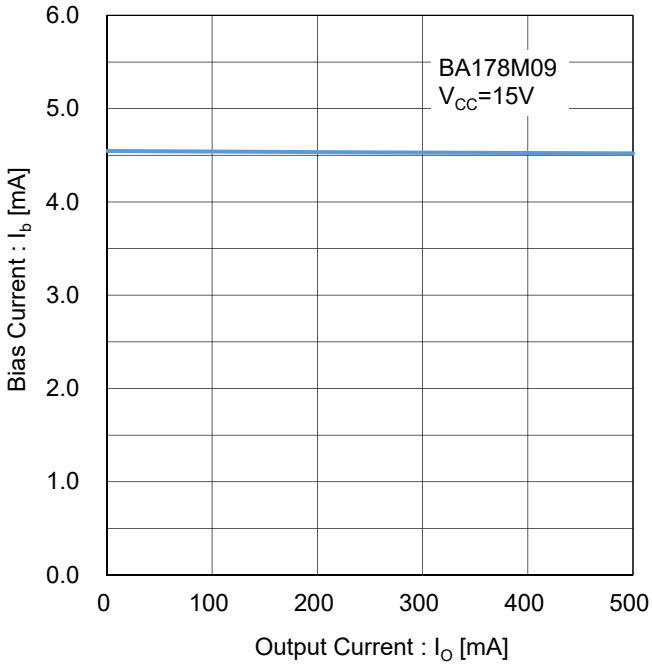


Figure 58. Bias Current vs Output Current
Test Circuit J

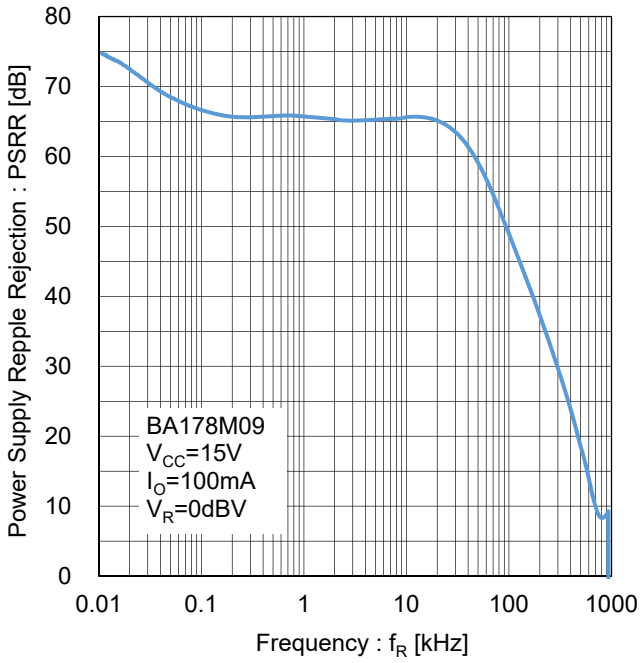


Figure 59. Ripple Rejection
Test Circuit K

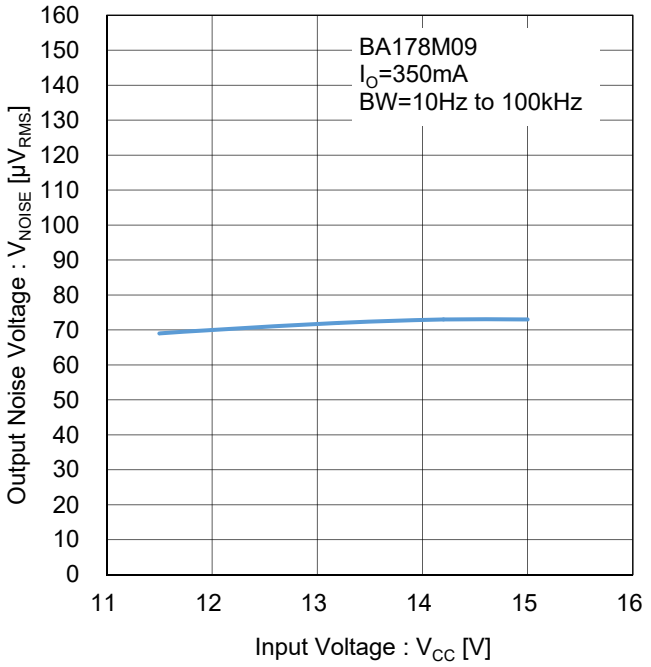


Figure 60. Output Noise Voltage
Test Circuit L

BA178M10 (V_O = 10V)

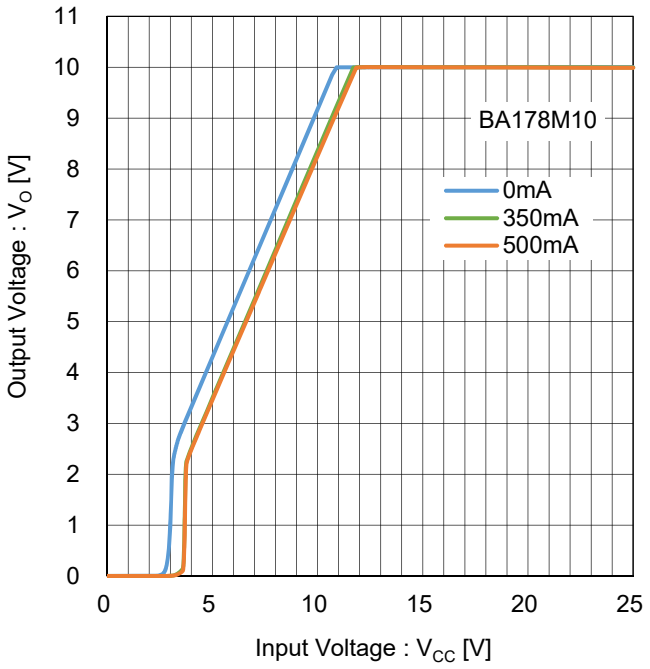


Figure 61. Output Voltage vs Input Voltage
Test Circuit A

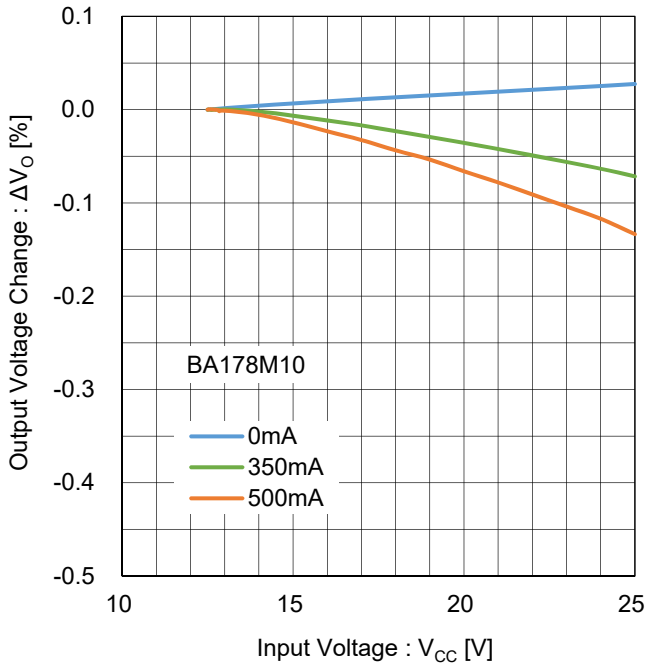


Figure 62. Line Regulation
Test Circuit B

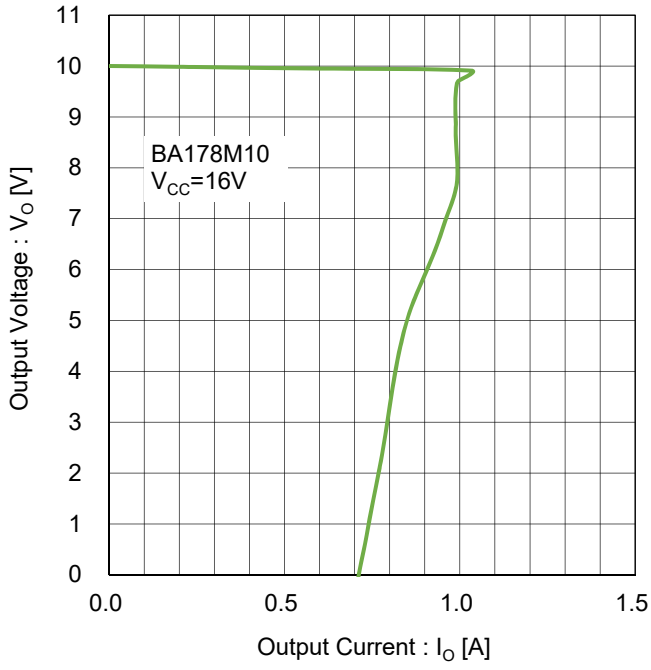


Figure 63. Overcurrent Protection
Test Circuit C

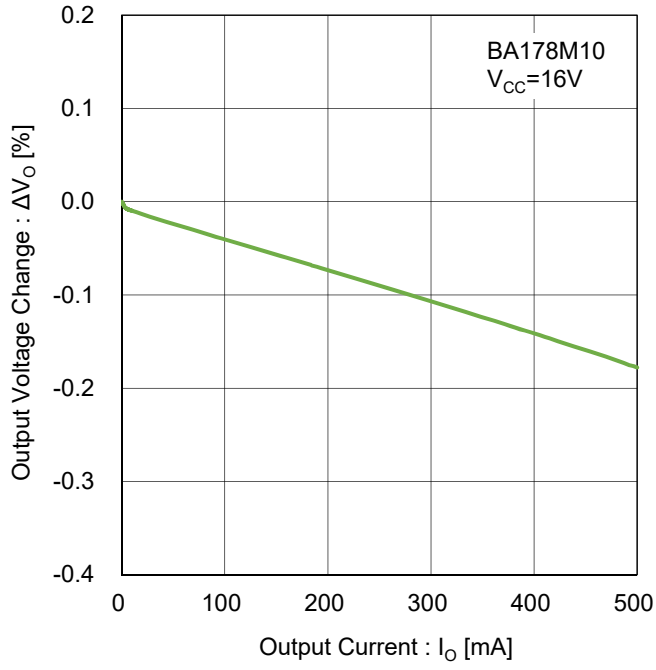


Figure 64. Load Regulation
Test Circuit D

BA178M10 (V_O = 10V)

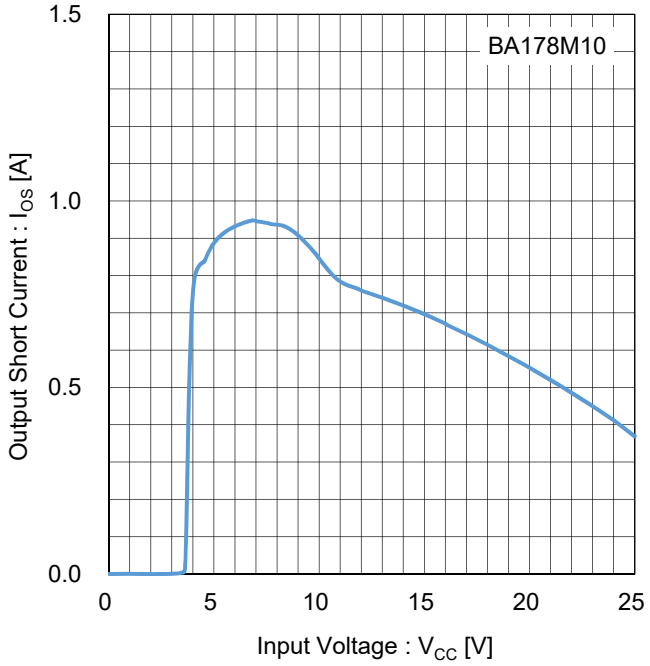


Figure 65. Output Short Current vs Input Voltage
Test Circuit E

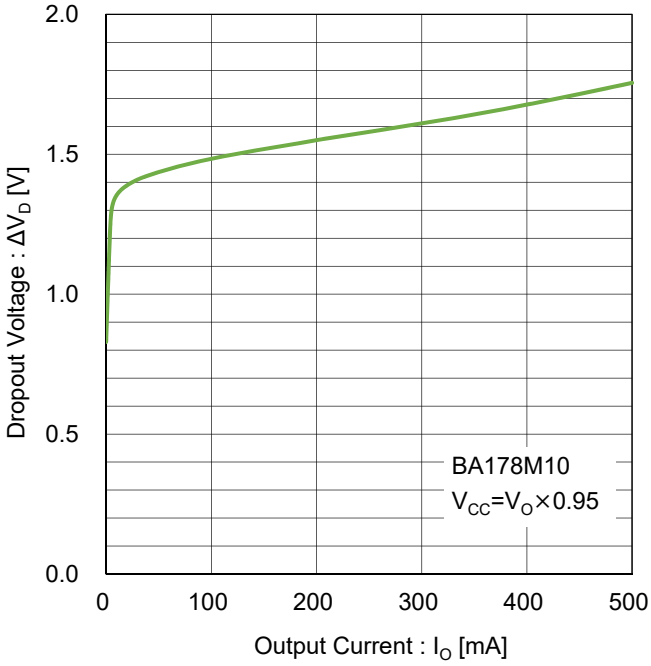


Figure 66. Dropout Voltage vs Output Current
Test Circuit F

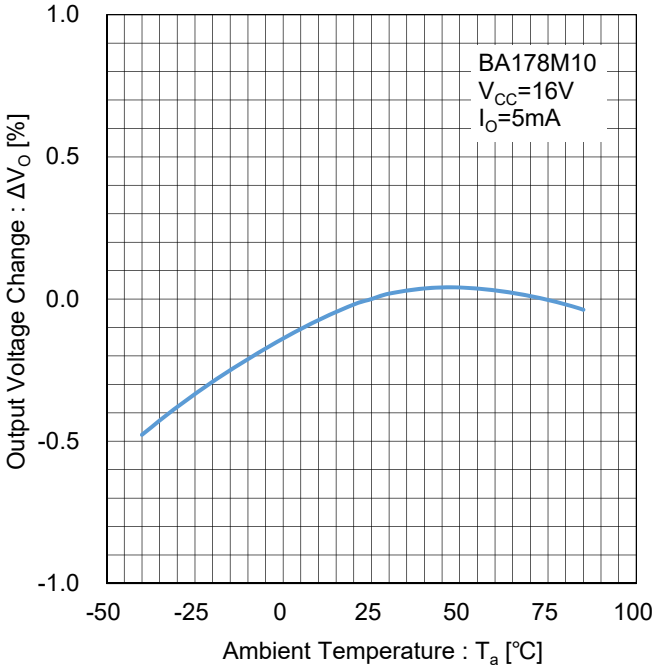


Figure 67. Output Voltage Temperature Stability
Test Circuit G

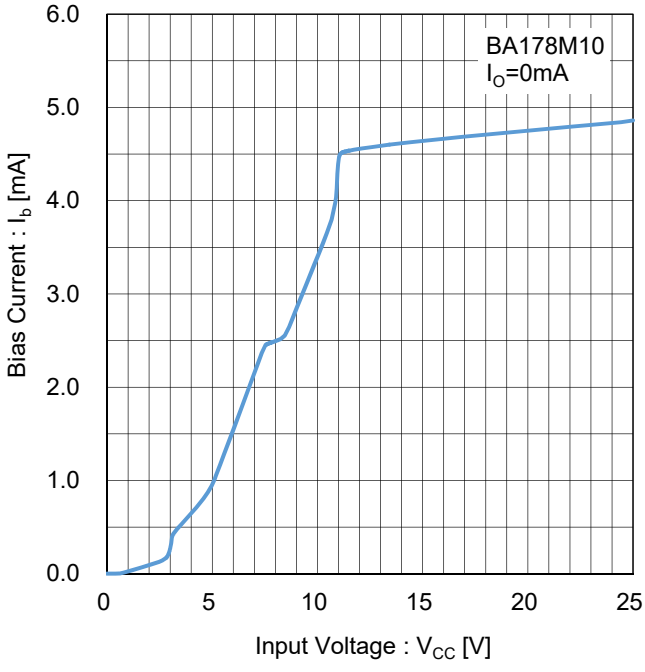


Figure 68. Bias Current vs Input Voltage
Test Circuit H

BA178M10 (V_O = 10V)

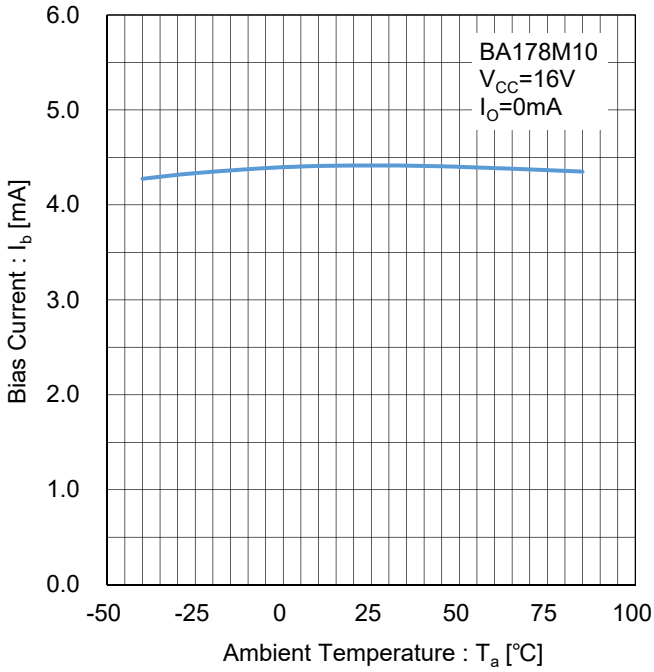


Figure 69. Bias Current vs Temperature
Test Circuit I

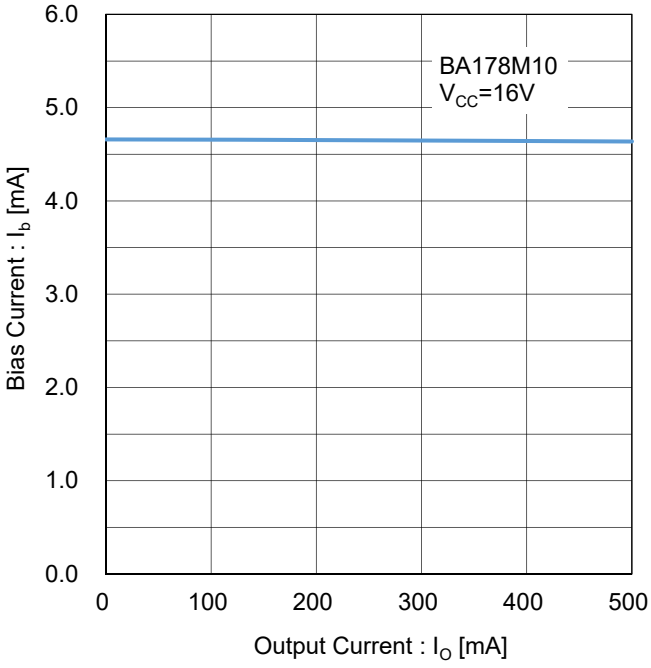


Figure 70. Bias Current vs Output Current
Test Circuit J

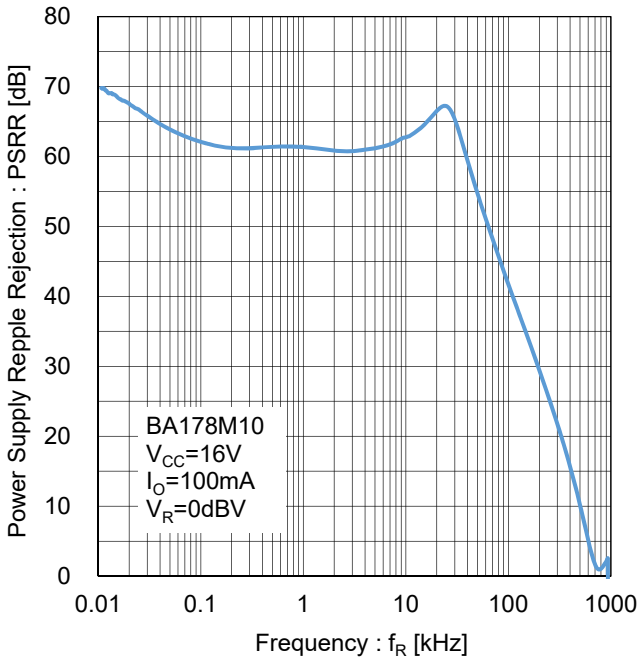


Figure 71. Ripple Rejection
Test Circuit K

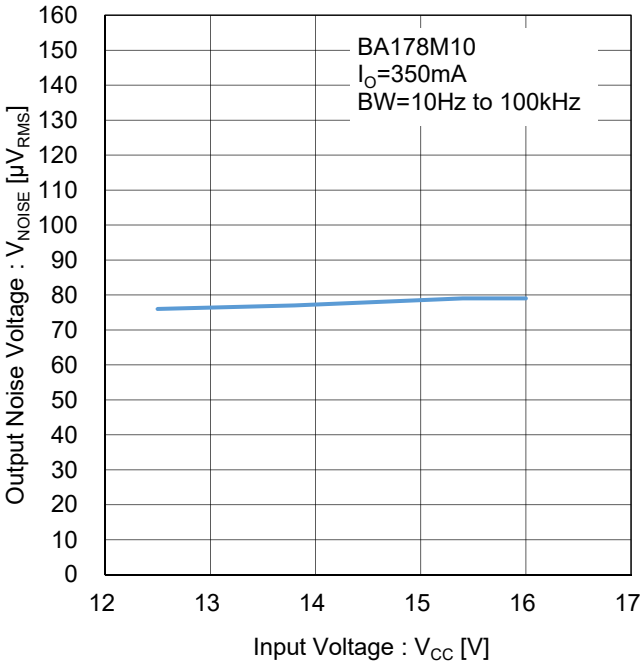


Figure 72. Output Noise Voltage
Test Circuit L

BA178M12 (V_O = 12V)

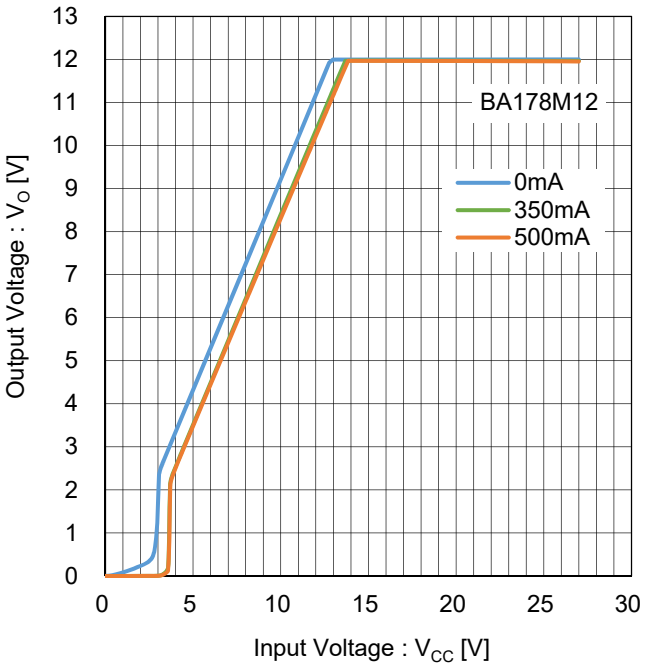


Figure 73. Output Voltage vs Input Voltage
Test Circuit A

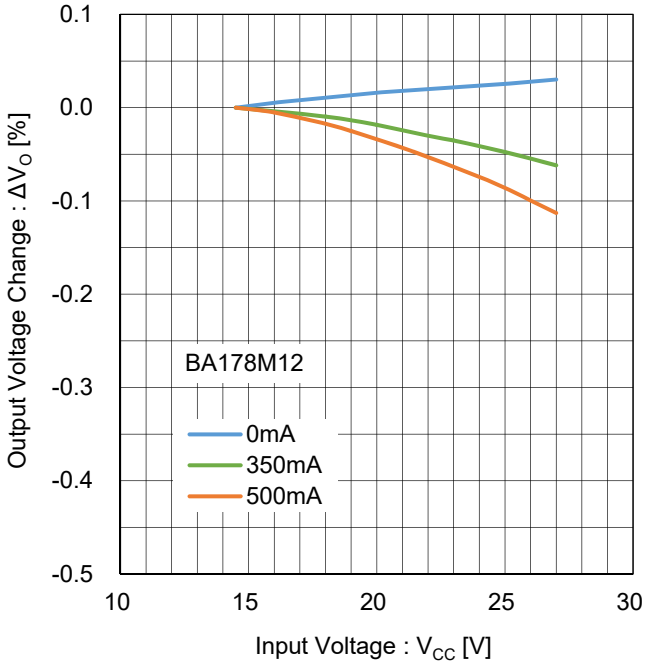


Figure 74. Line Regulation
Test Circuit B

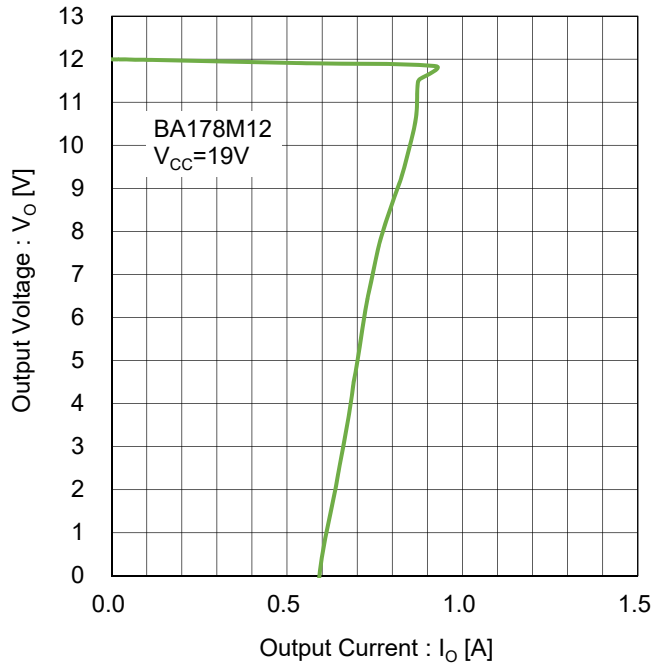


Figure 75. Overcurrent Protection
Test Circuit C

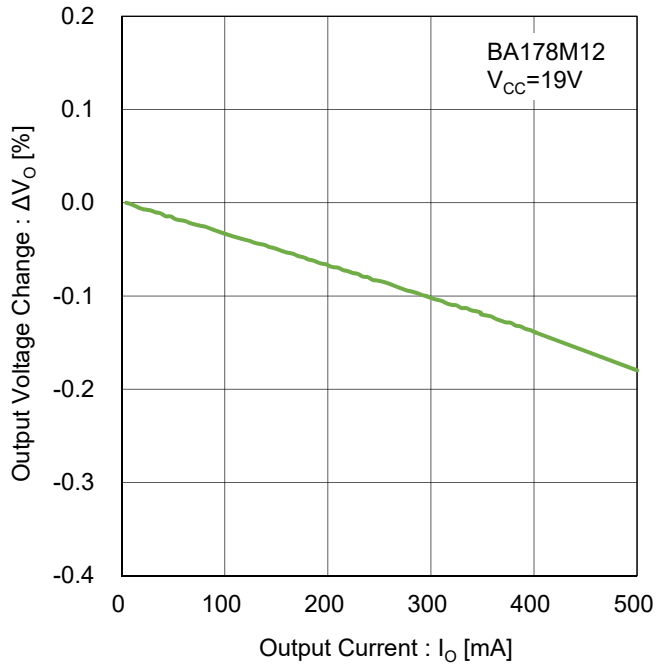


Figure 76. Load Regulation
Test Circuit D

BA178M12 (V_O = 12V)

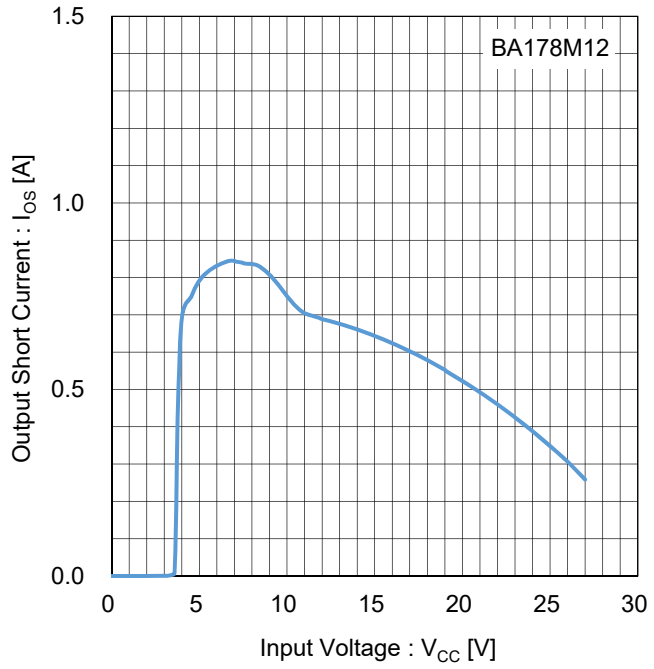


Figure 77. Output Short Current vs Input Voltage
Test Circuit E

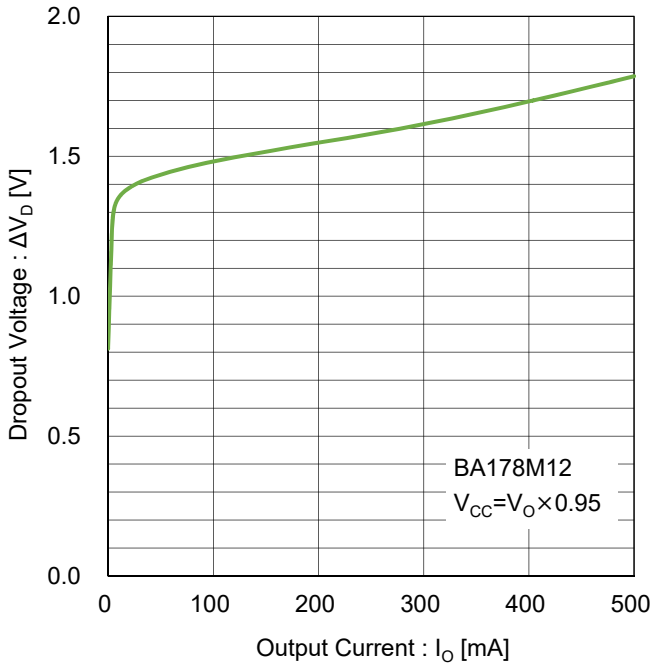


Figure 78. Dropout Voltage vs Output Current
Test Circuit F

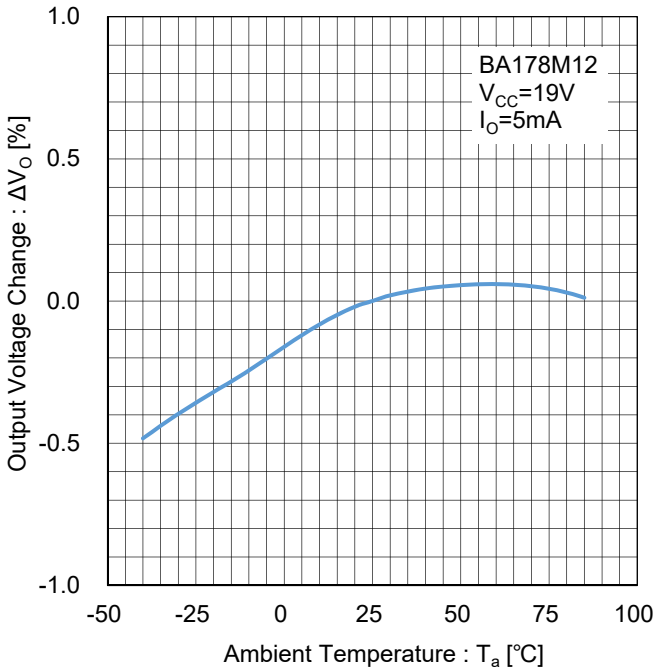


Figure 79. Output Voltage Temperature Stability
Test Circuit G

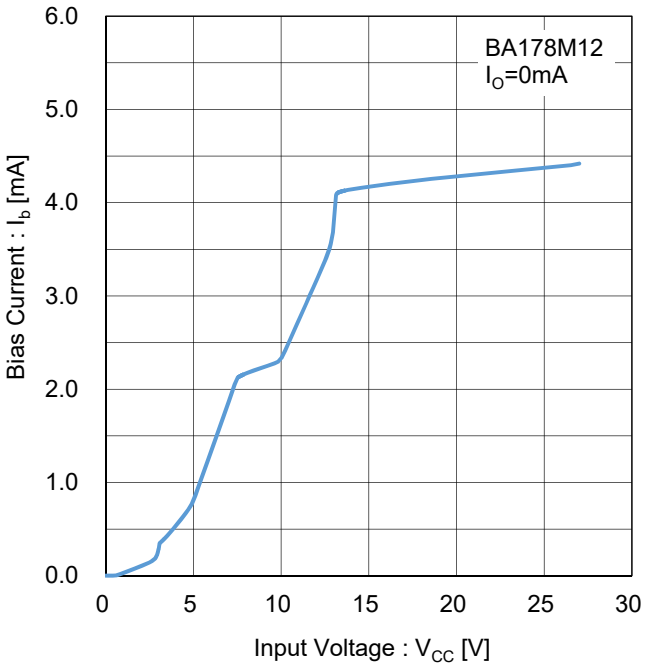


Figure 80. Bias Current vs Input Voltage
Test Circuit H

BA178M12 (V_O = 12V)

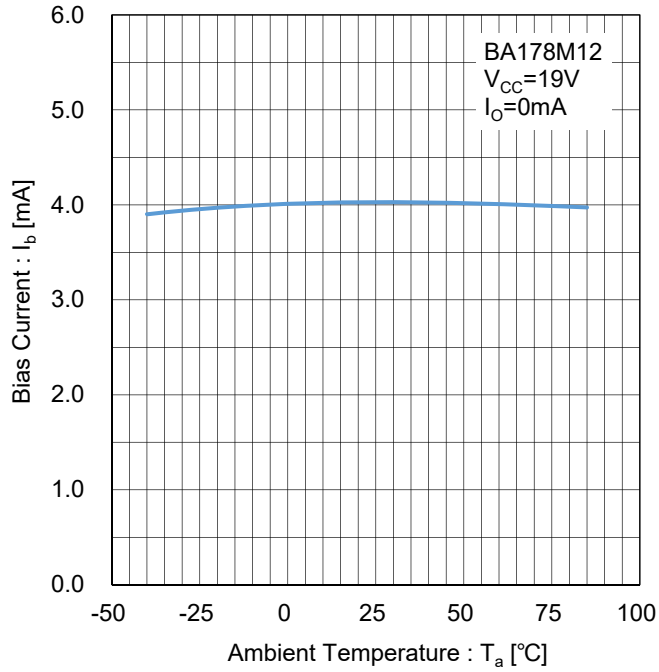


Figure 81. Bias Current vs Temperature
Test Circuit I

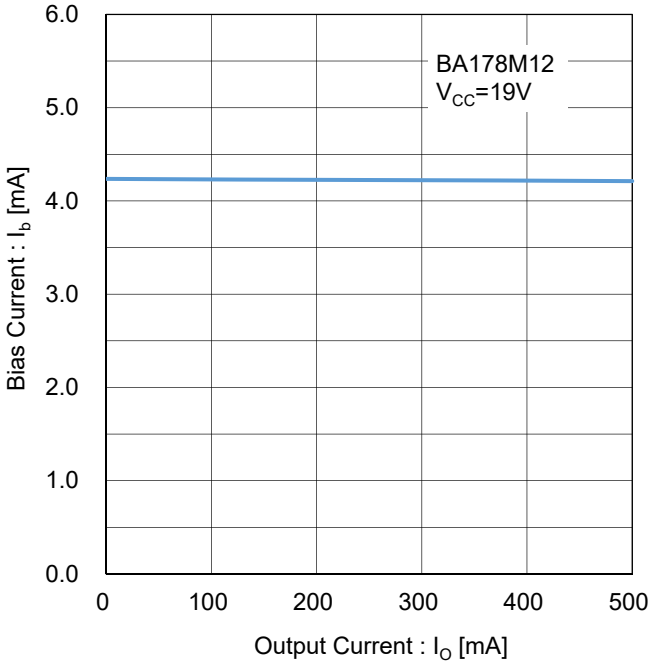


Figure 82. Bias Current vs Output Current
Test Circuit J

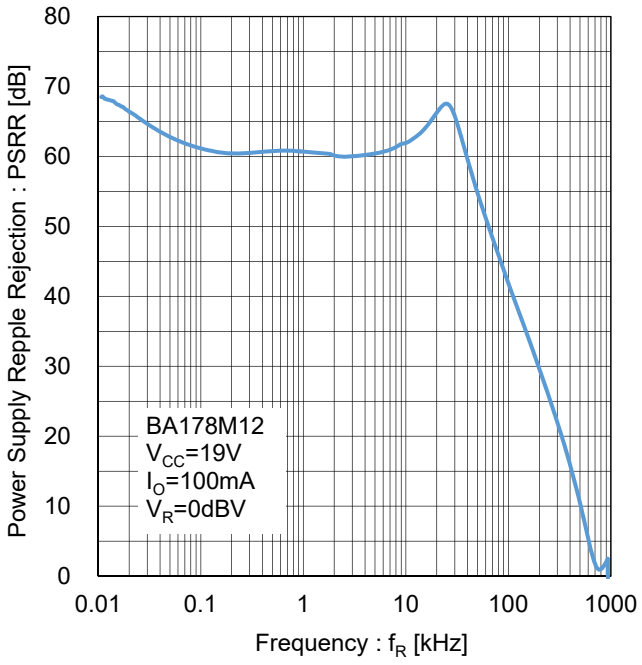


Figure 83. Ripple Rejection
Test Circuit K

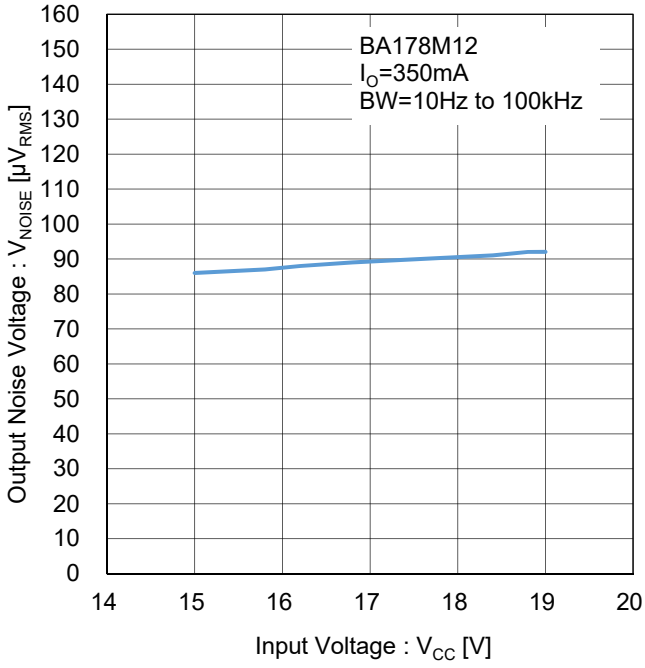


Figure 84. Output Noise Voltage
Test Circuit L

BA178M15 (V_O = 15V)

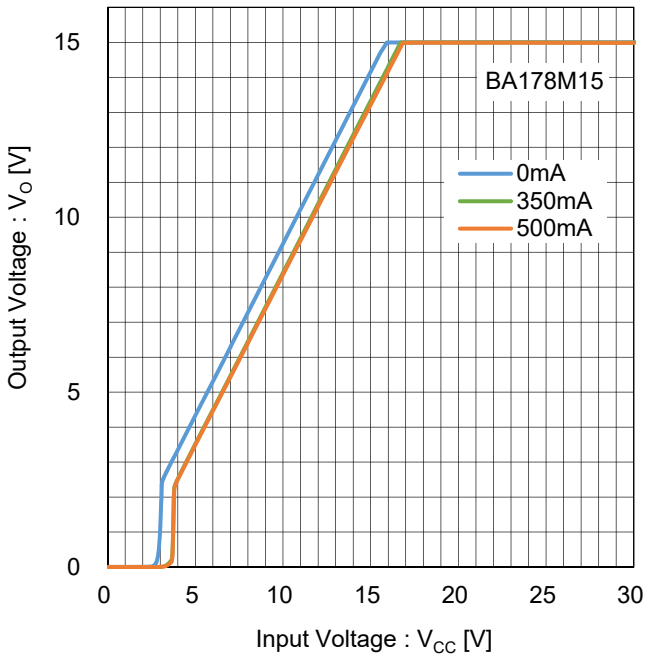


Figure 85. Output Voltage vs Input Voltage
Test Circuit A

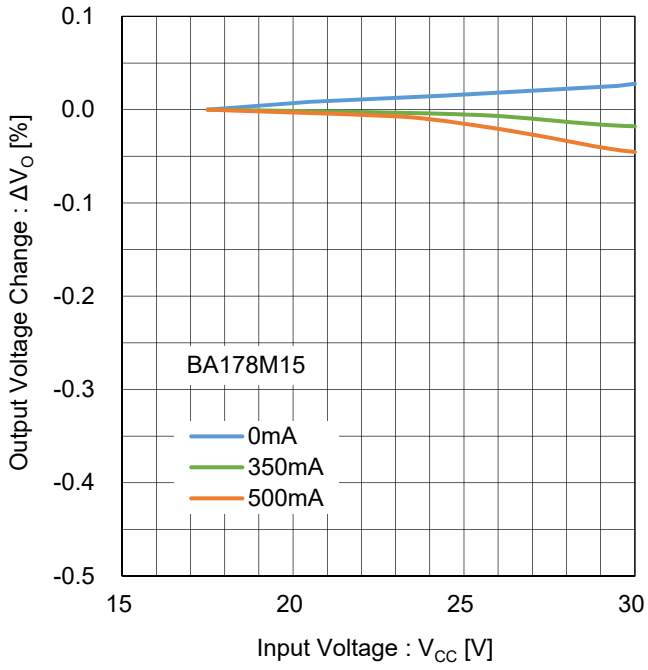


Figure 86. Line Regulation
Test Circuit B

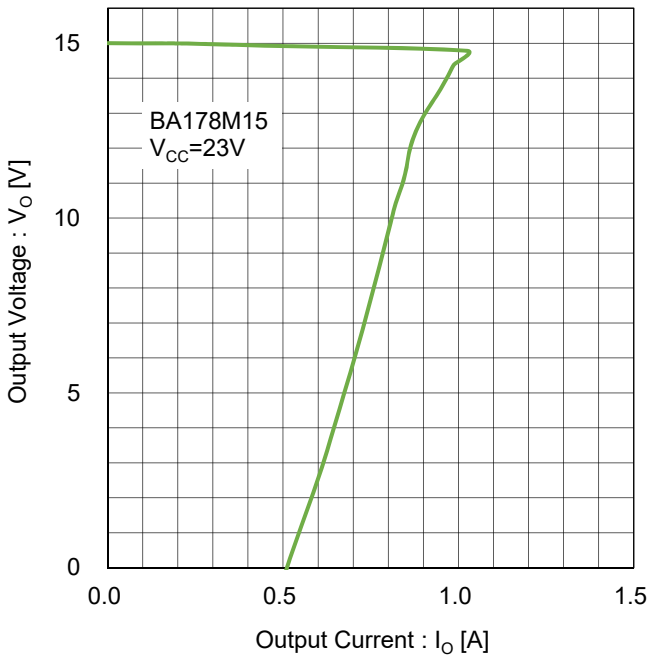


Figure 87. Overcurrent Protection
Test Circuit C

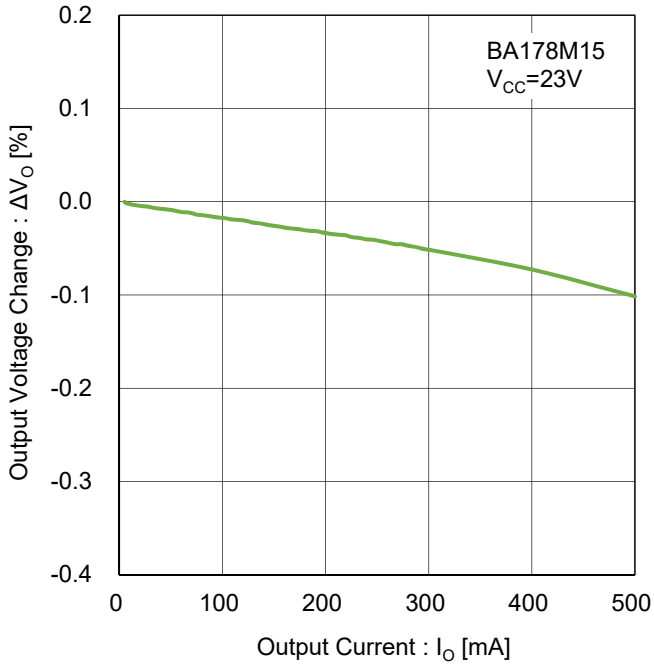


Figure 88. Load Regulation
Test Circuit D

BA178M15 (V_O = 15V)

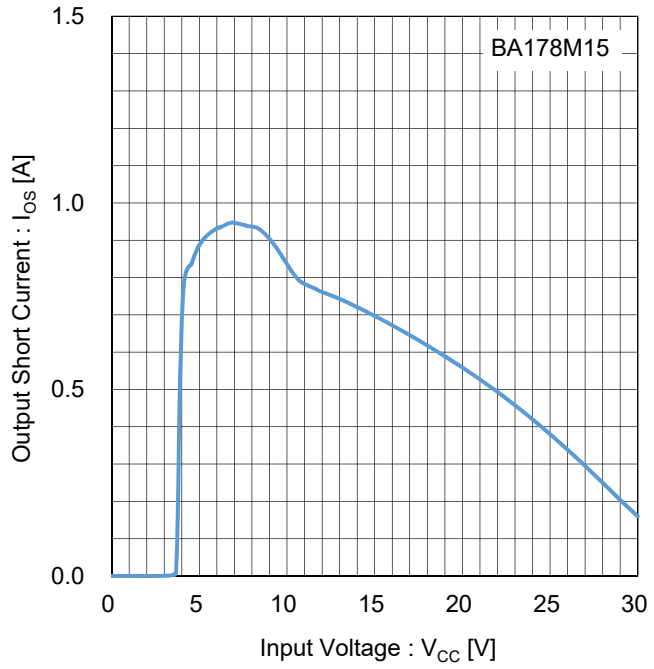


Figure 89. Output Short Current vs Input Voltage
Test Circuit E

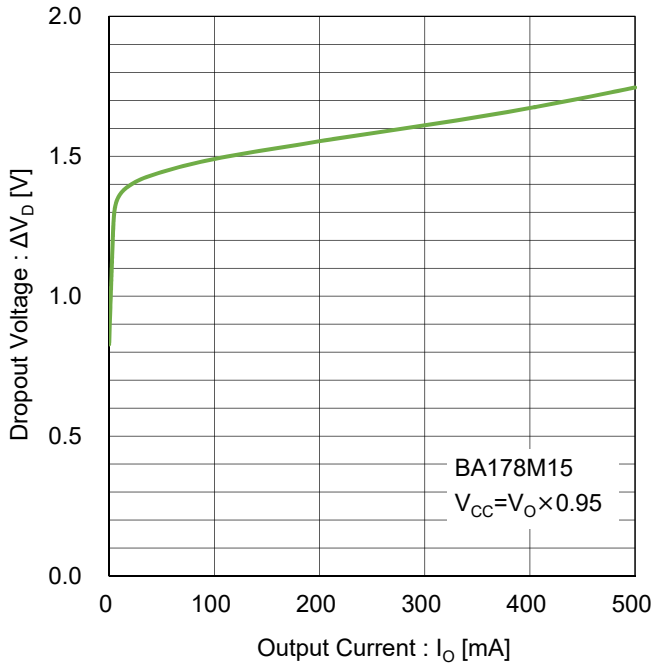


Figure 90. Dropout Voltage vs Output Current
Test Circuit F

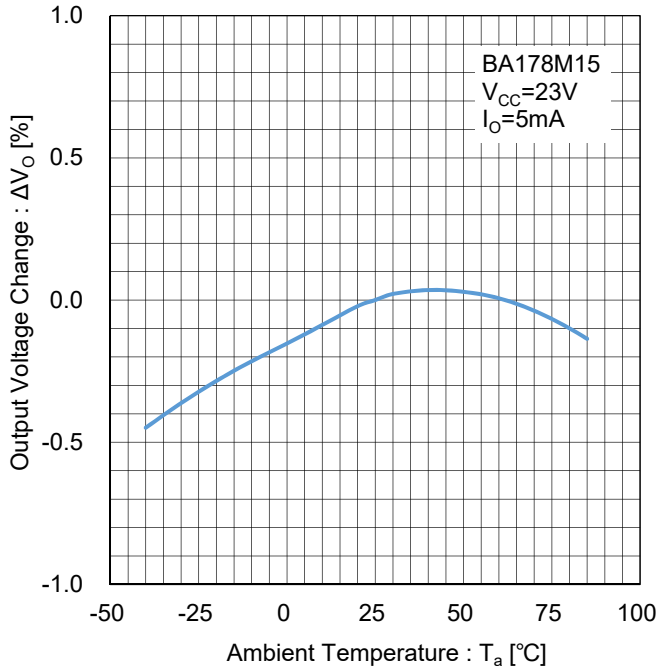


Figure 91. Output Voltage Temperature Stability
Test Circuit G

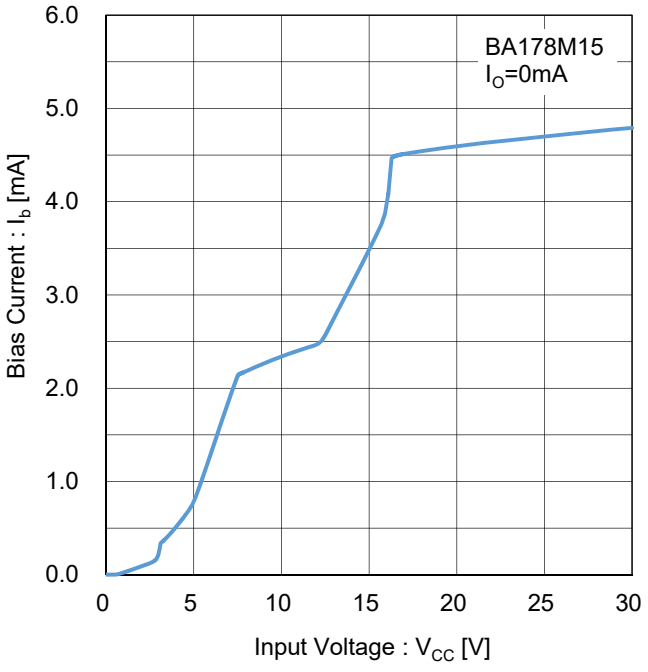


Figure 92. Bias Current vs Input Voltage
Test Circuit H

BA178M15 (V_O = 15V)

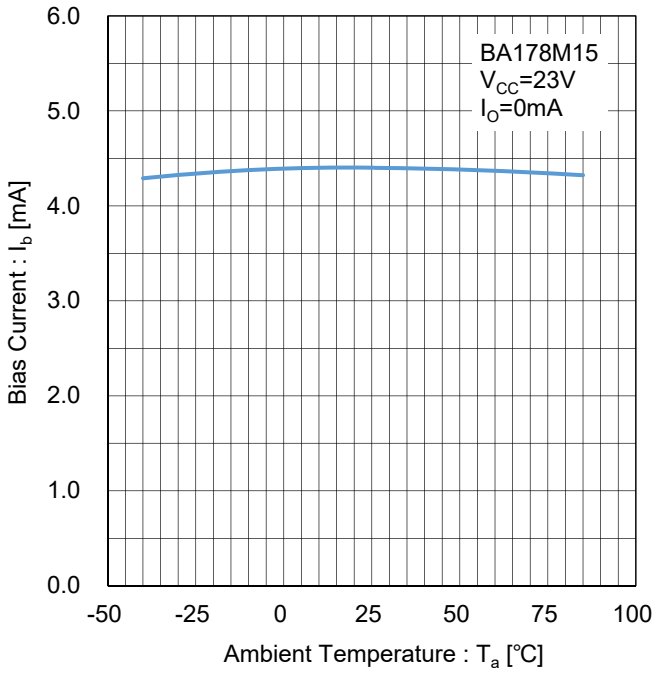


Figure 93. Bias Current vs Temperature
Test Circuit I

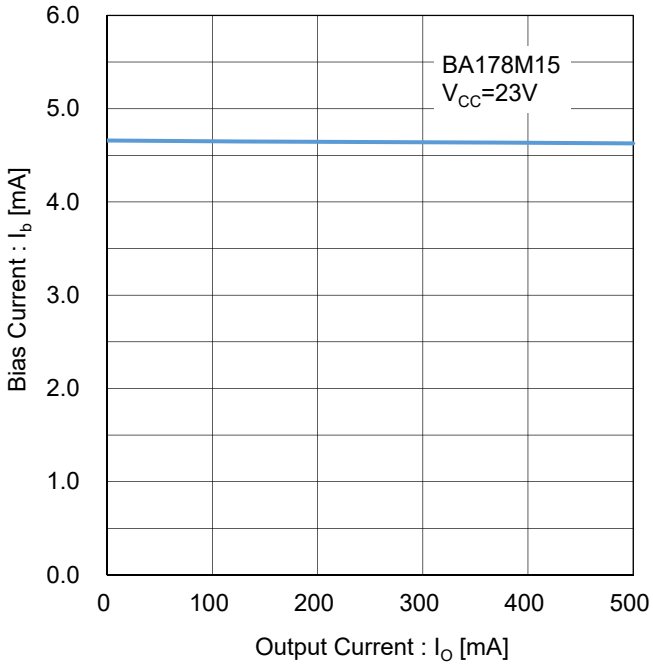


Figure 94. Bias Current vs Output Current
Test Circuit J

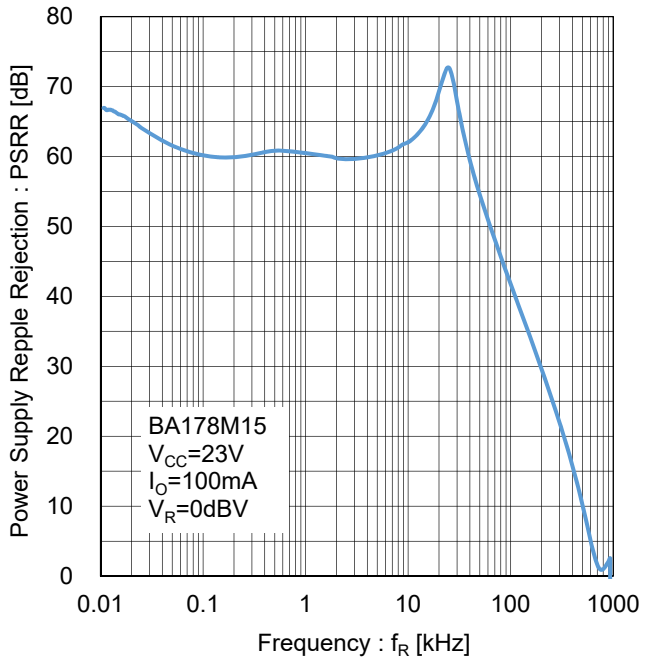


Figure 95. Ripple Rejection
Test Circuit K

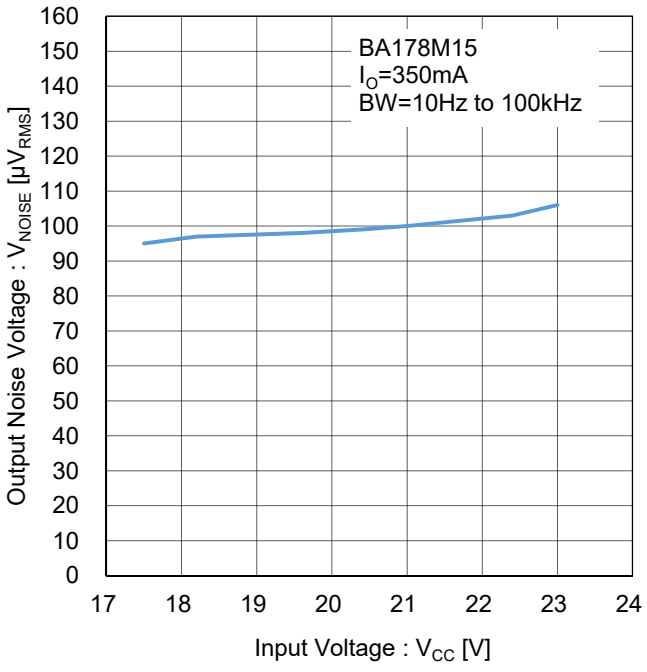


Figure 96. Output Noise Voltage
Test Circuit L

BA178M18 (V_O = 18V)

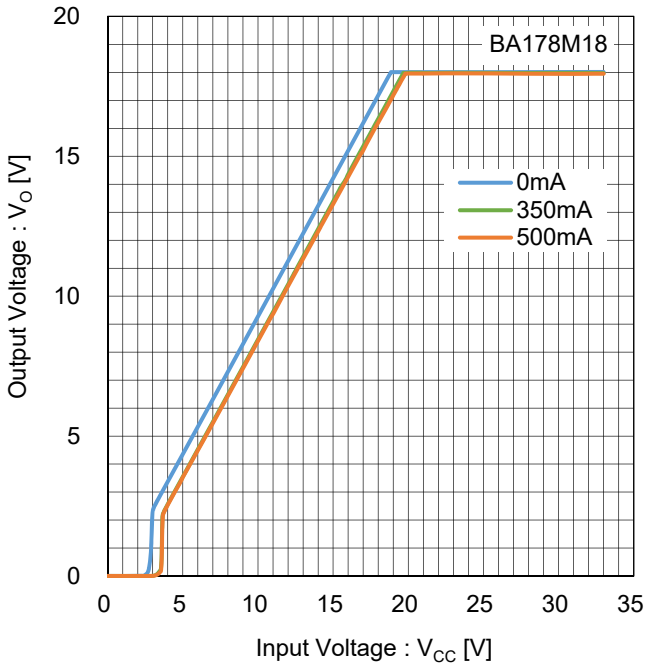


Figure 97. Output Voltage vs Input Voltage
Test Circuit A

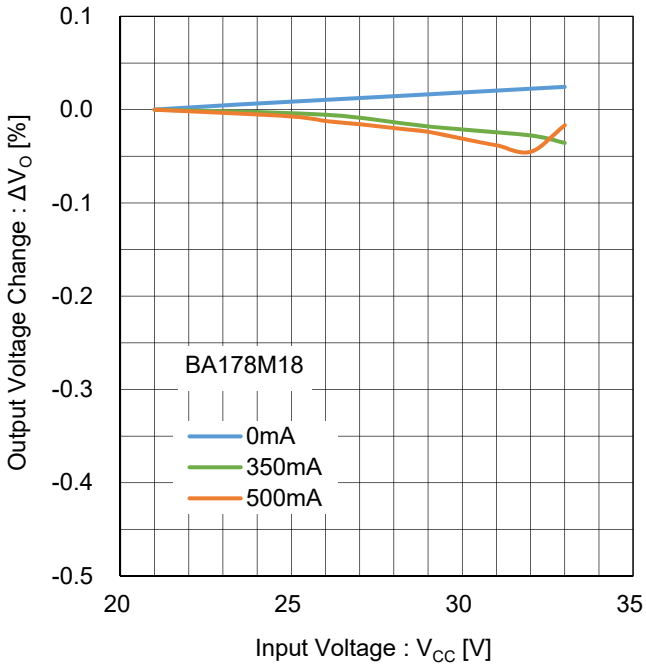


Figure 98. Line Regulation
Test Circuit B

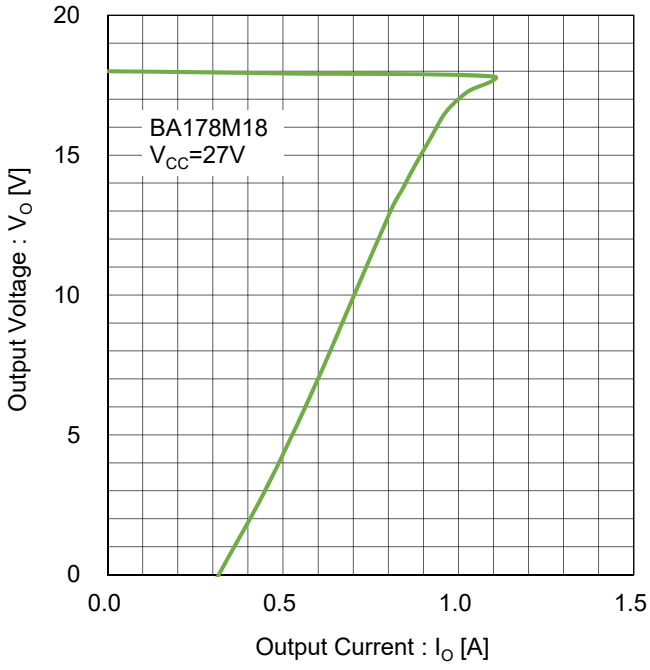


Figure 99. Overcurrent Protection
Test Circuit C

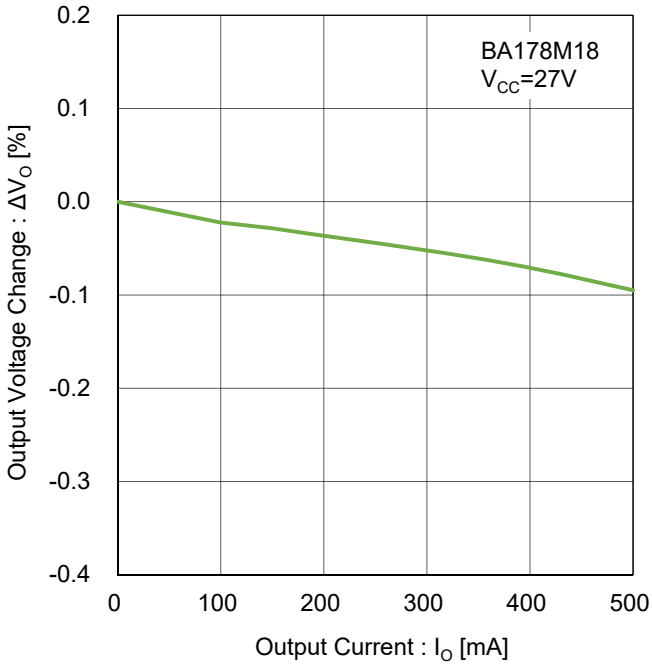


Figure 100. Load Regulation
Test Circuit D

BA178M18 (V_O = 18V)

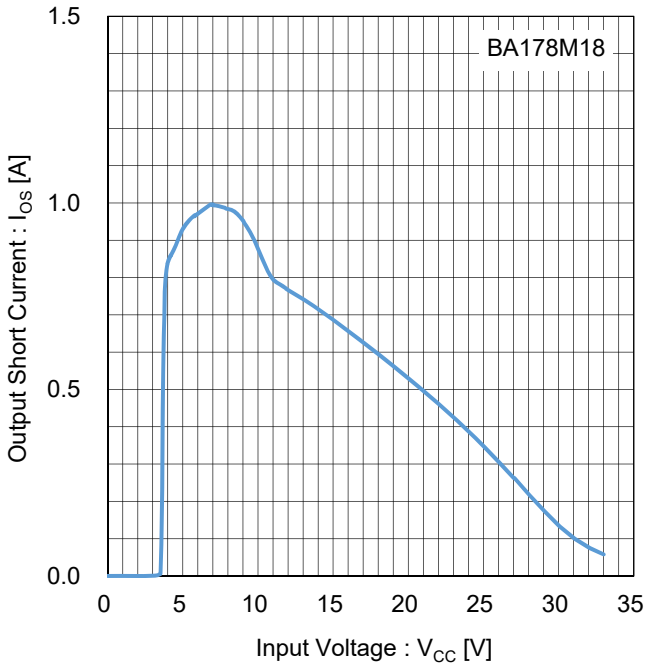


Figure 101. Output Short Current vs Input Voltage
Test Circuit E

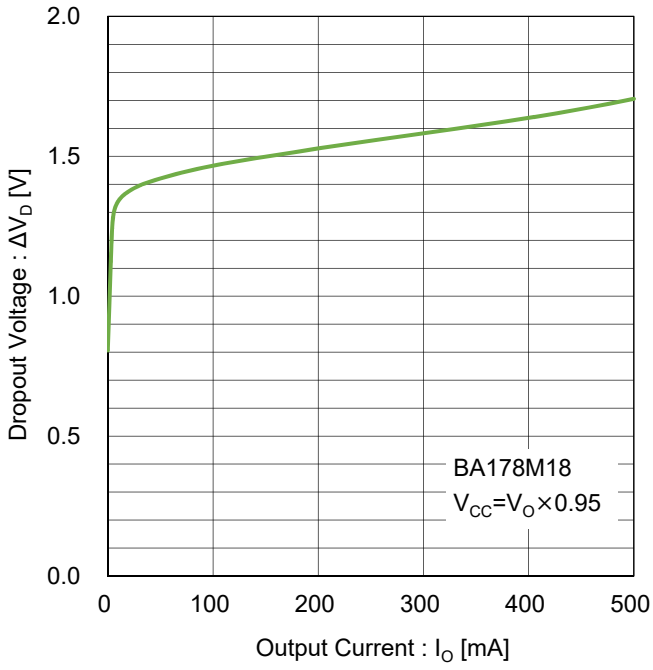


Figure 102. Dropout Voltage vs Output Current
Test Circuit F

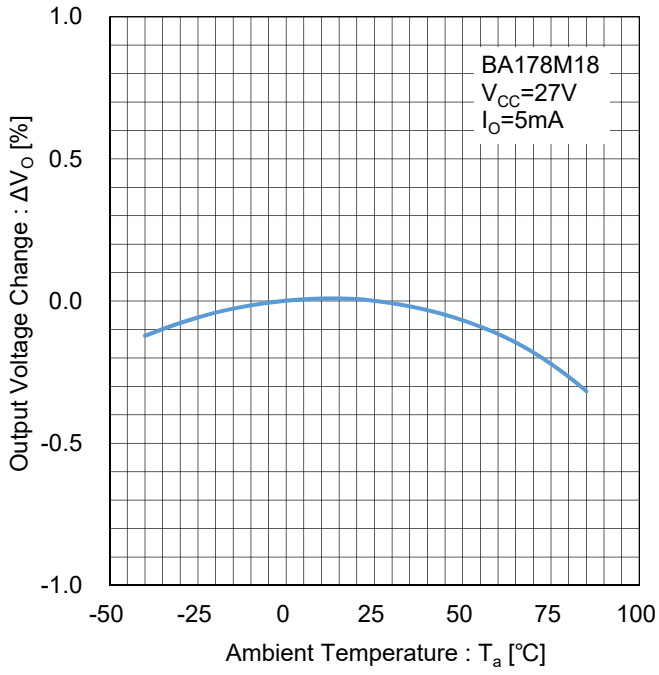


Figure 103. Output Voltage Temperature Stability
Test Circuit G

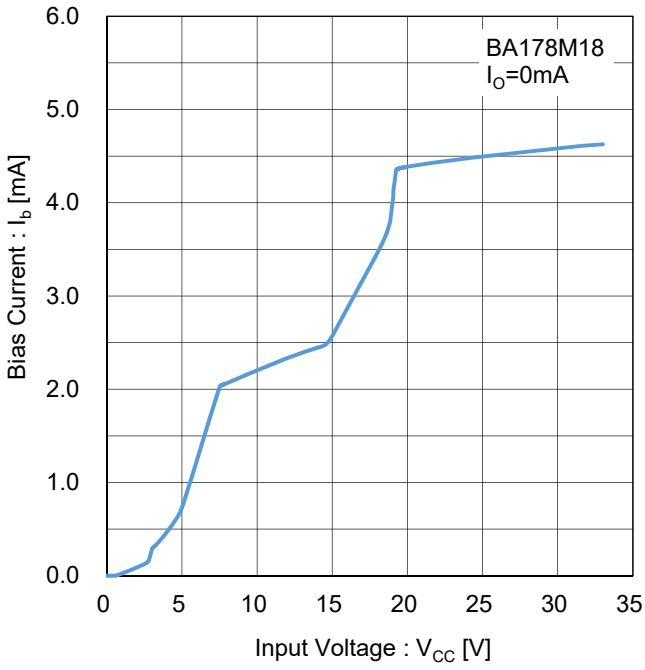


Figure 104. Bias Current vs Input Voltage
Test Circuit H

BA178M18 (V_O = 18V)

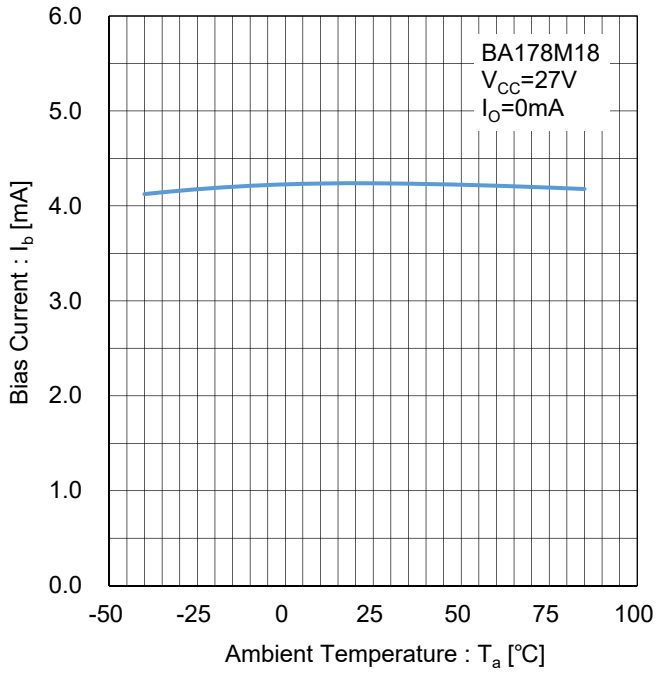


Figure 105. Bias Current vs Temperature
Test Circuit I

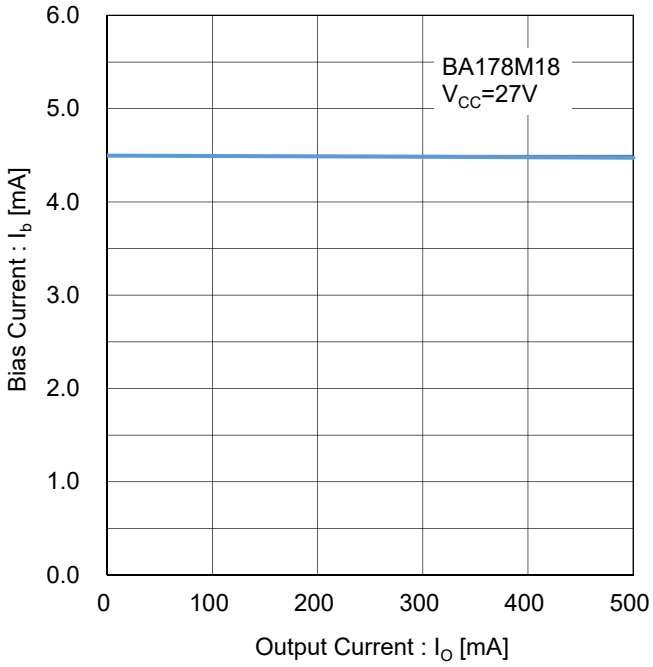


Figure 106. Bias Current vs Output Current
Test Circuit J

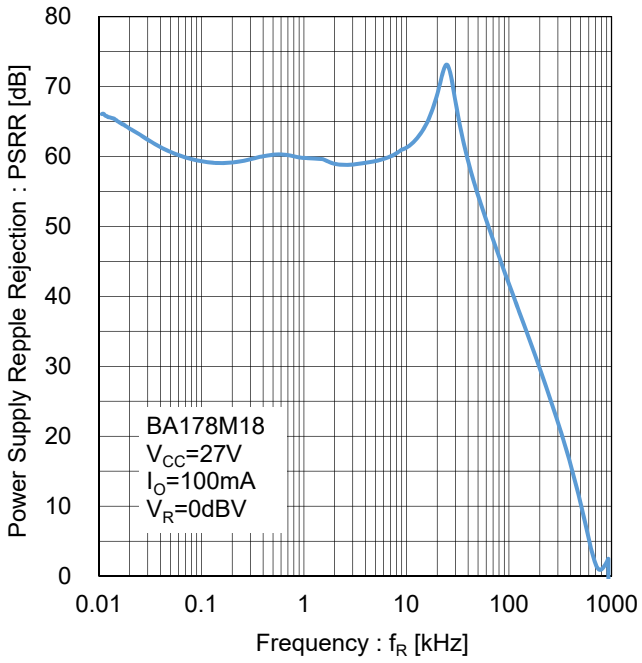


Figure 107. Ripple Rejection
Test Circuit K

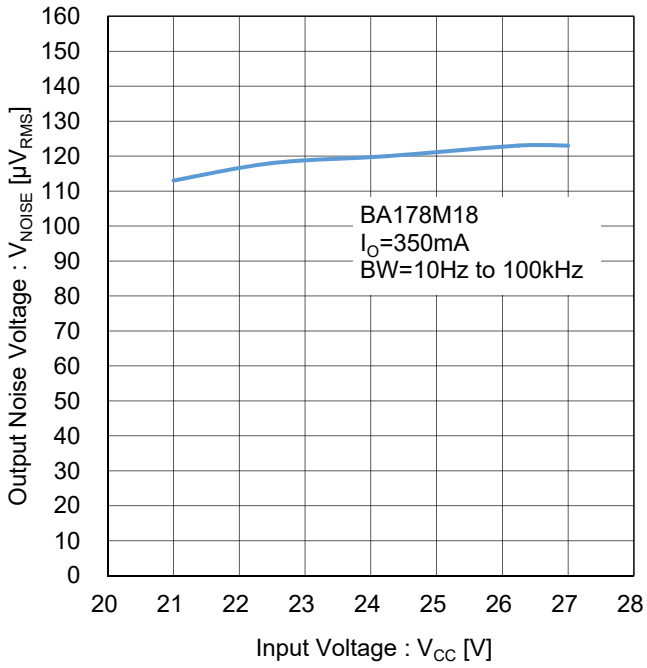


Figure 108. Output Noise Voltage
Test Circuit L

BA178M20 (V_O = 20V)

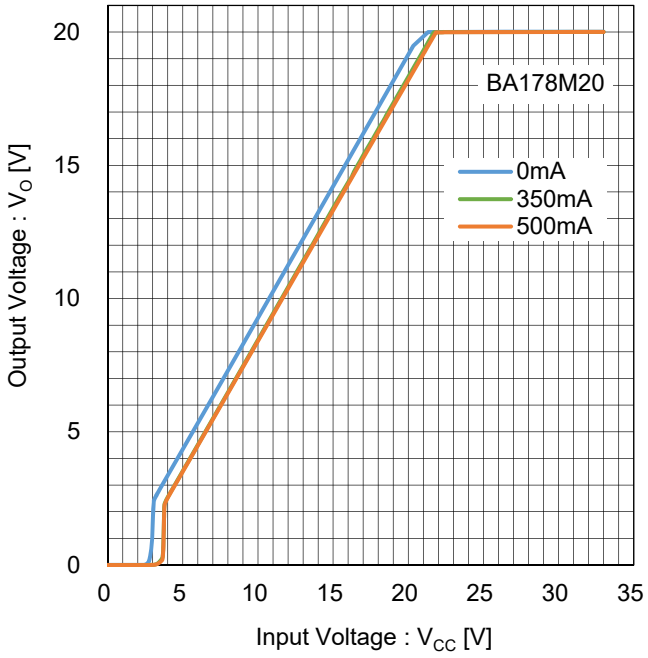


Figure 109. Output Voltage vs Input Voltage
Test Circuit A

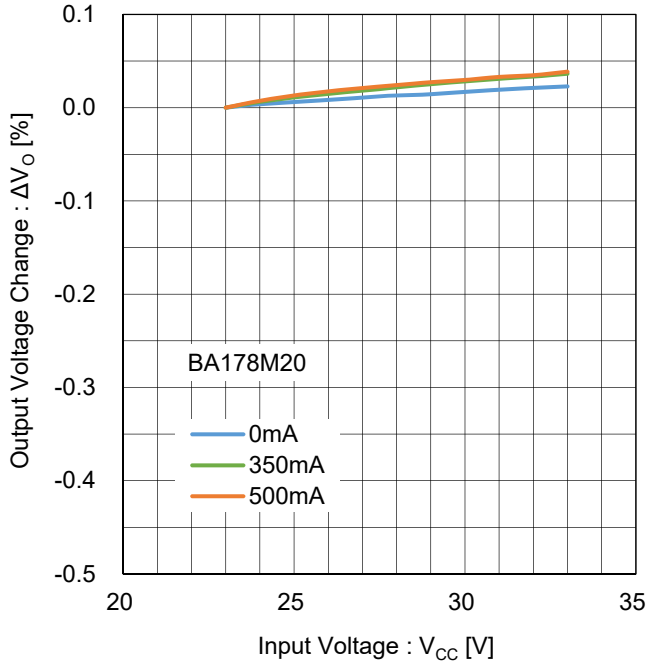


Figure 110. Line Regulation
Test Circuit B

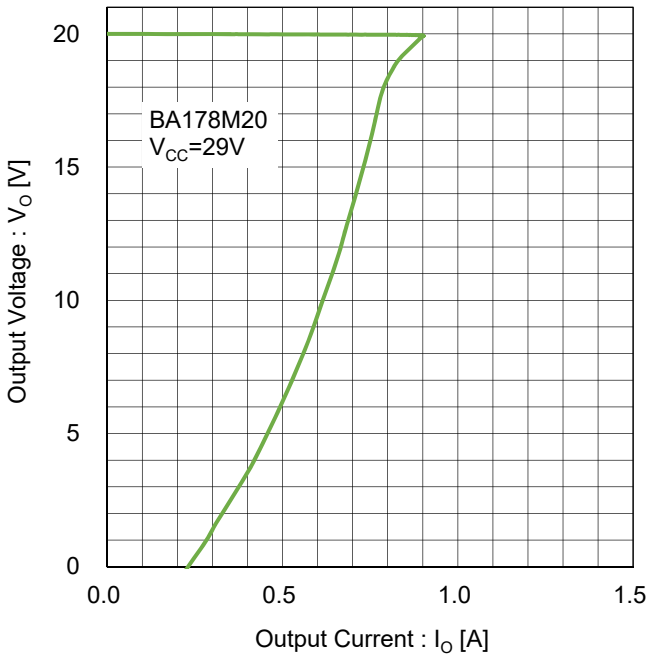


Figure 111. Overcurrent Protection
Test Circuit C

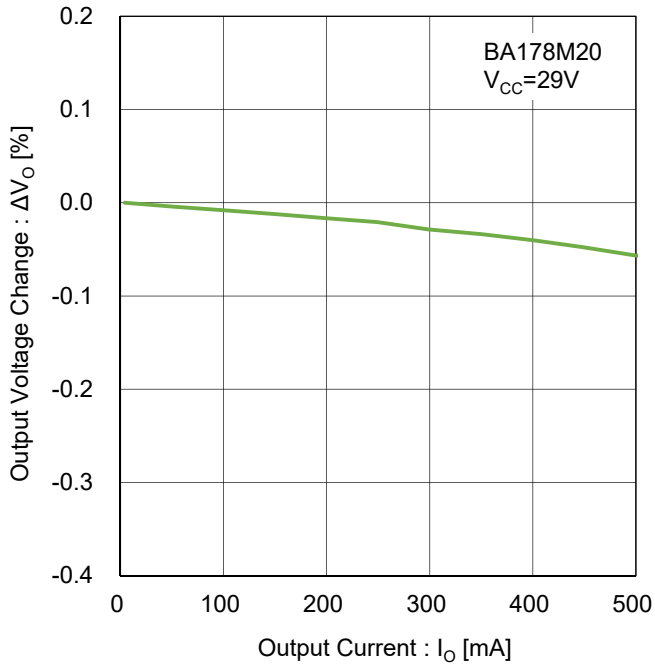


Figure 112. Load Regulation
Test Circuit D

BA178M20 (V_O = 20V)

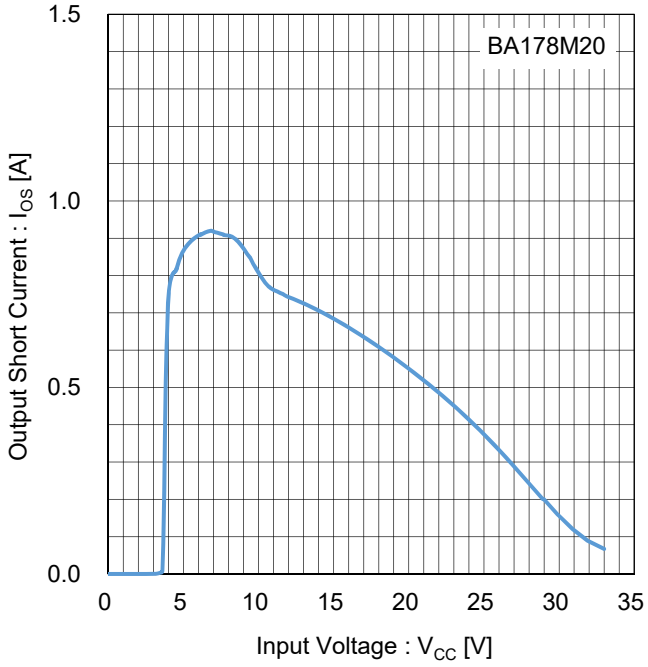


Figure 113. Output Short Current vs Input Voltage
Test Circuit E

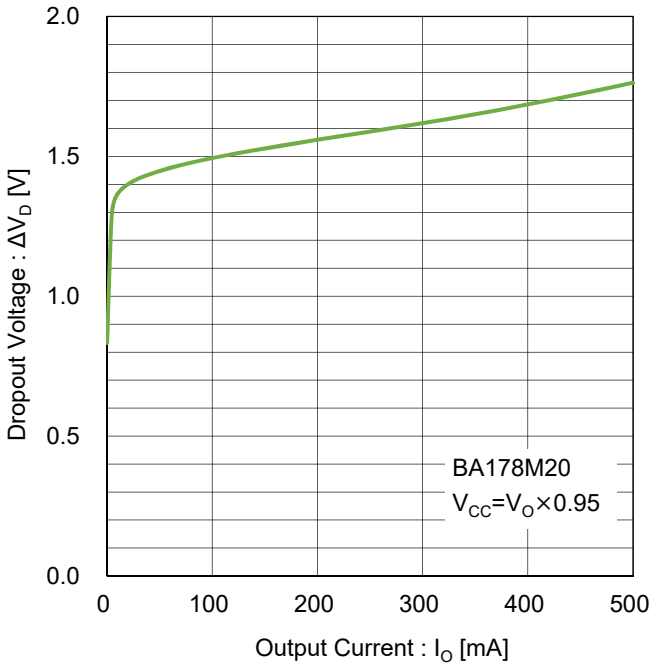


Figure 114. Dropout Voltage vs Output Current
Test Circuit F

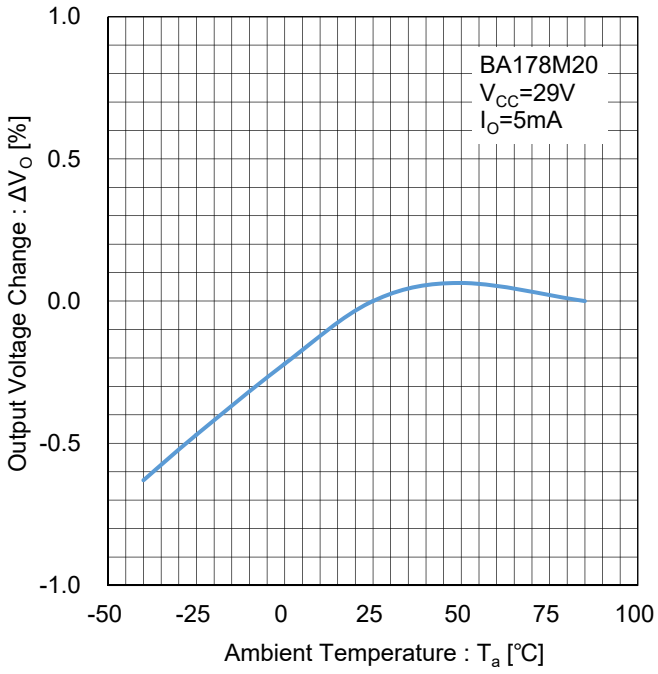


Figure 115. Output Voltage Temperature Stability
Test Circuit G

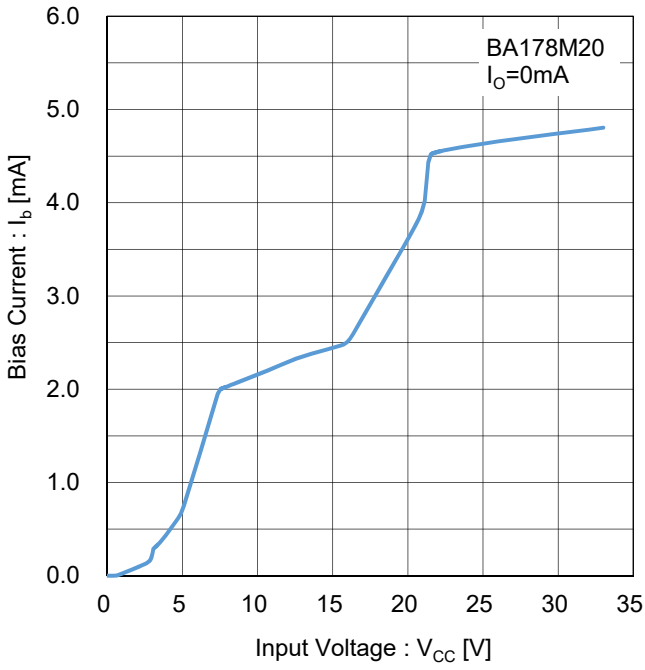


Figure 116. Bias Current vs Input Voltage
Test Circuit H

BA178M20 (V_O = 20V)

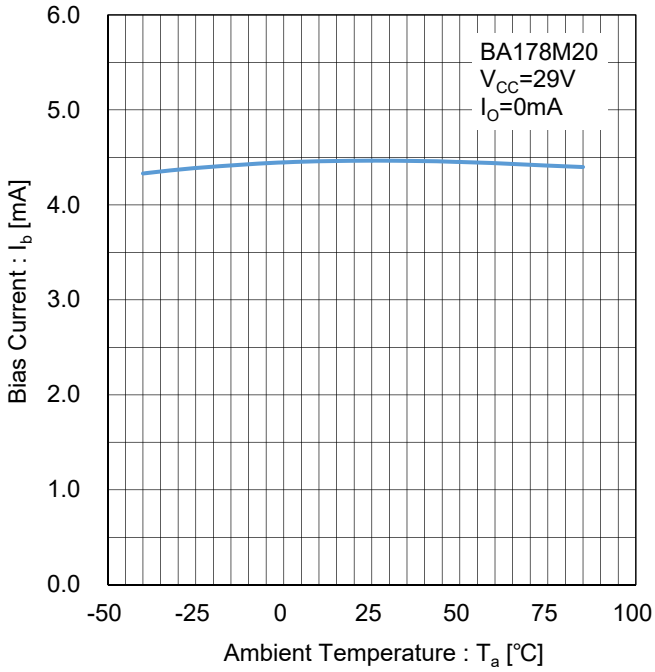


Figure 117. Bias Current vs Temperature
Test Circuit I

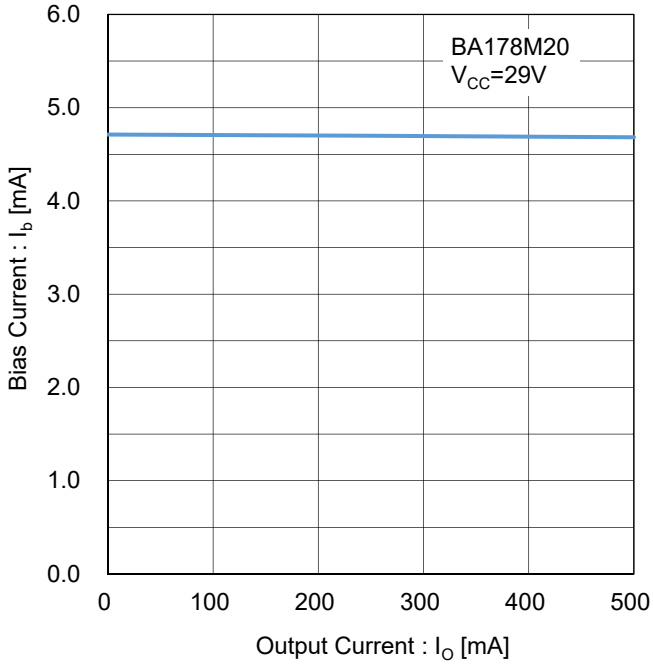


Figure 118. Bias Current vs Output Current
Test Circuit J

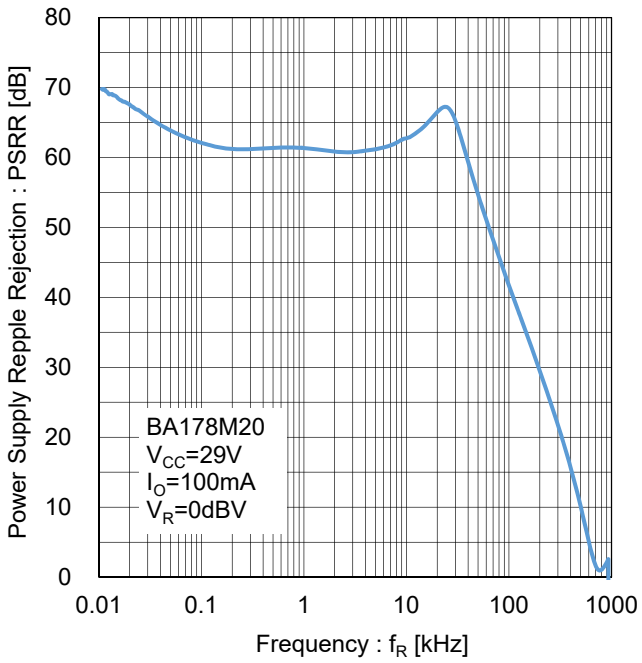


Figure 119. Ripple Rejection
Test Circuit K

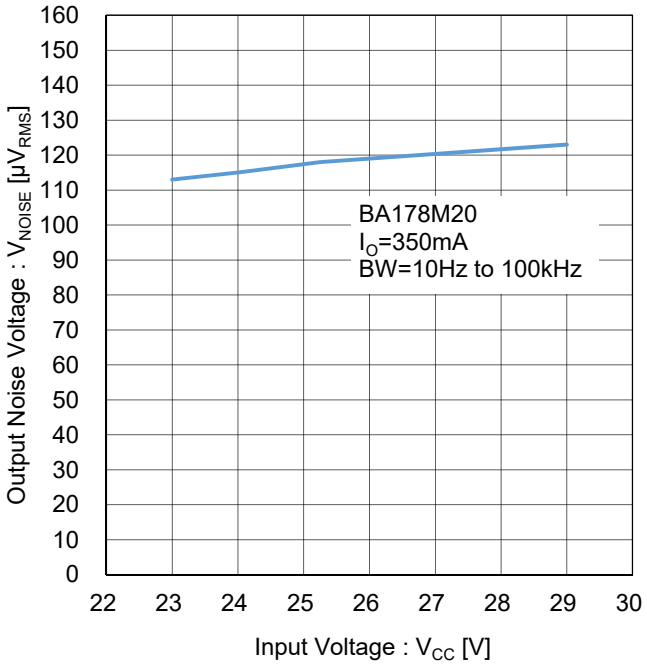


Figure 120. Output Noise Voltage
Test Circuit L

BA178M24 (V_O = 24V)

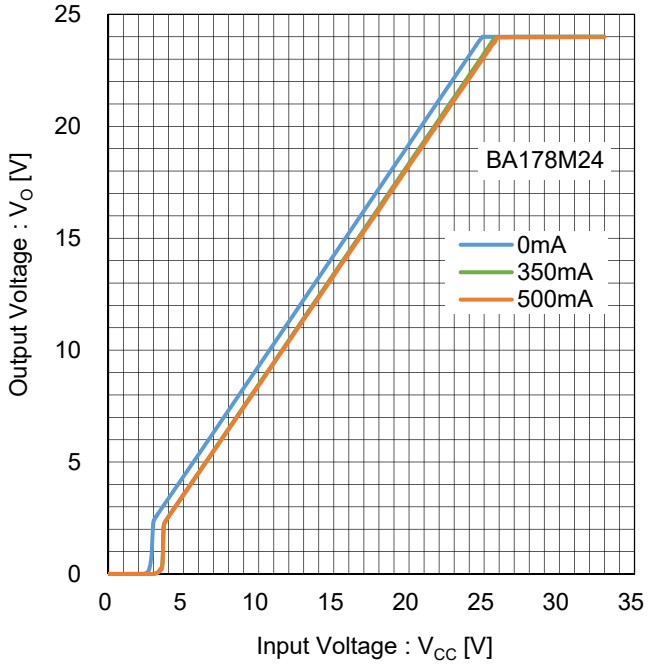


Figure 121. Output Voltage vs Input Voltage
Test Circuit A

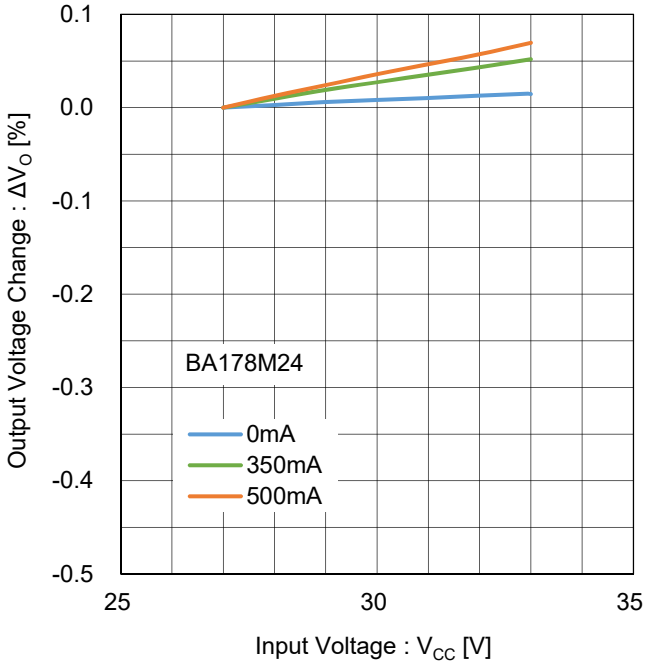


Figure 122. Line Regulation
Test Circuit B

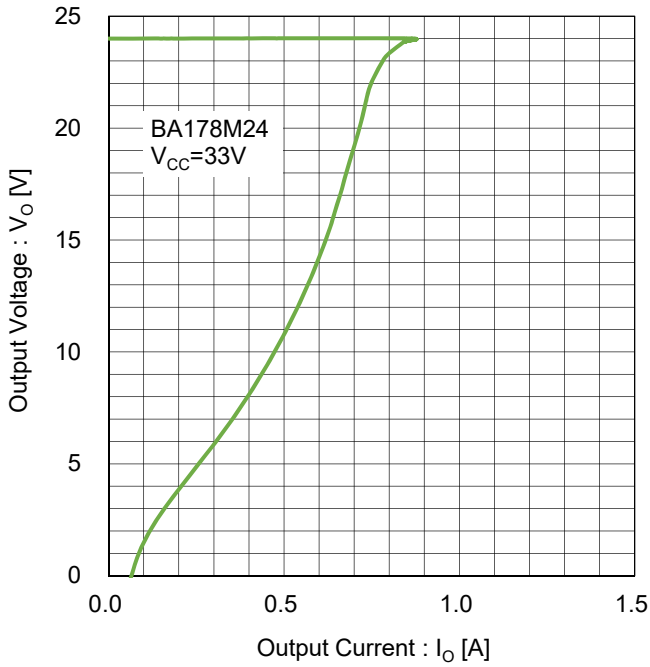


Figure 123. Overcurrent Protection
Test Circuit C

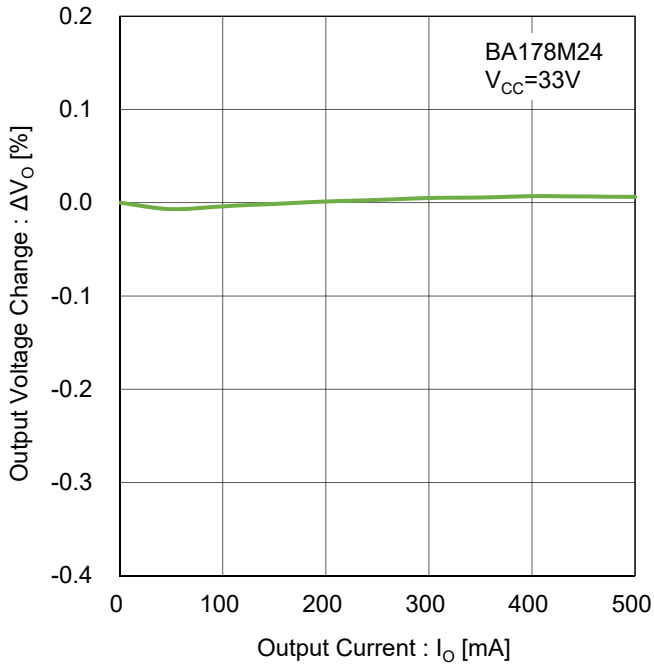


Figure 124. Load Regulation
Test Circuit D

BA178M24 (V_O = 24V)

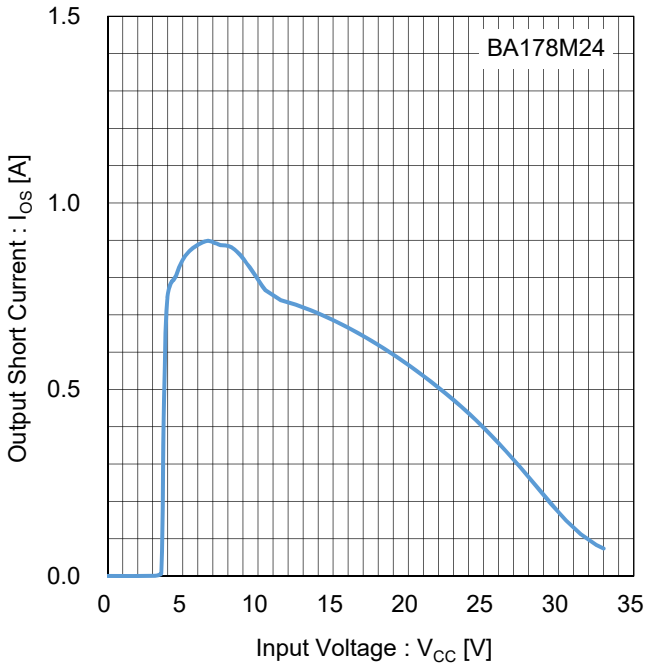


Figure 125. Output Short Current vs Input Voltage
Test Circuit E

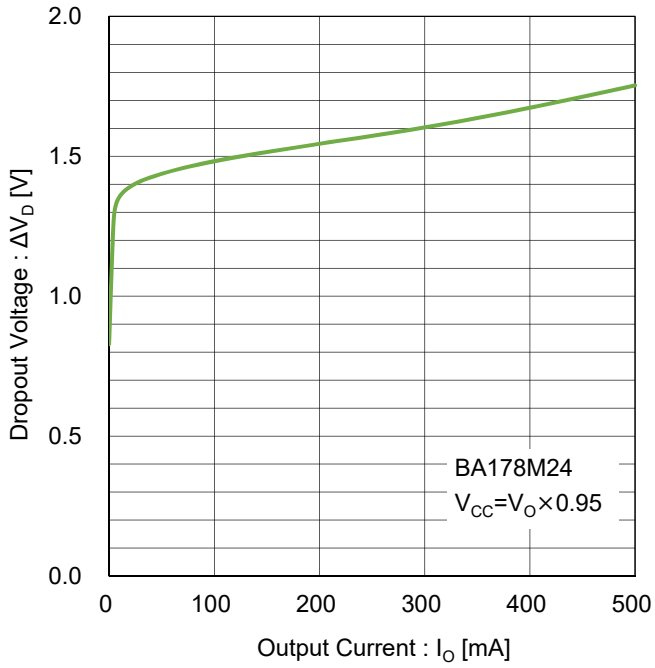


Figure 126. Dropout Voltage vs Output Current
Test Circuit F

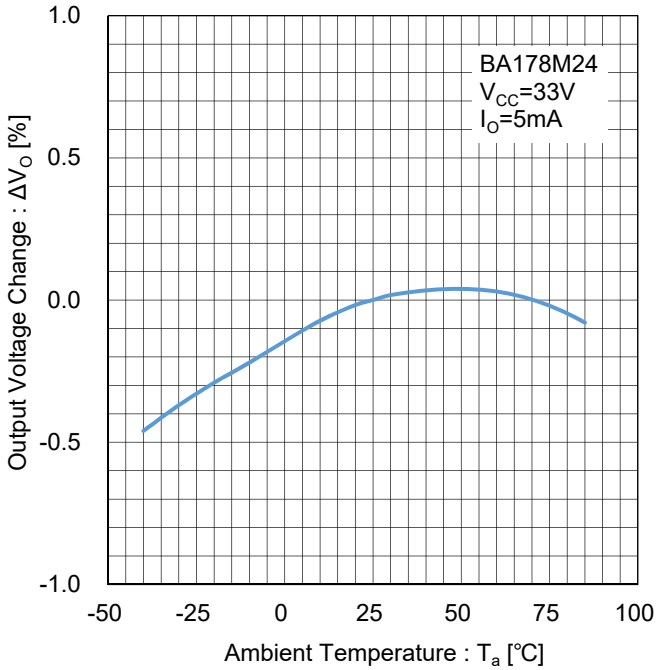


Figure 127. Output Voltage Temperature Stability
Test Circuit G

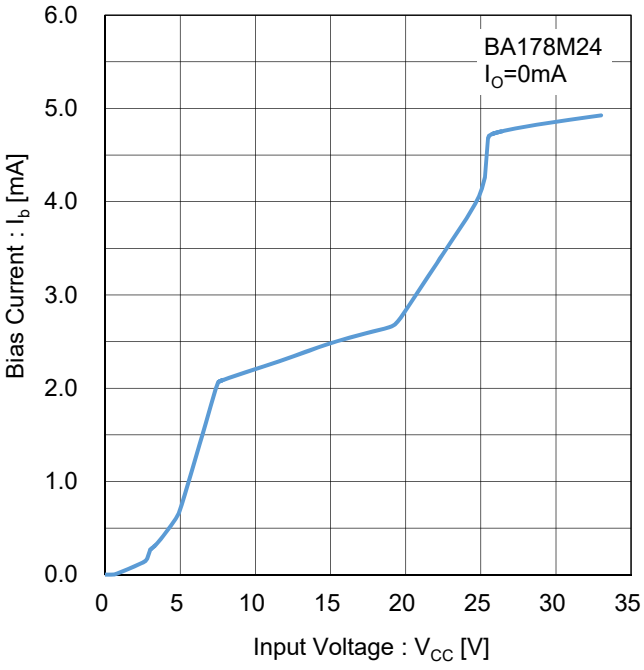


Figure 128. Bias Current vs Input Voltage
Test Circuit H

BA178M24 (V_O = 24V)

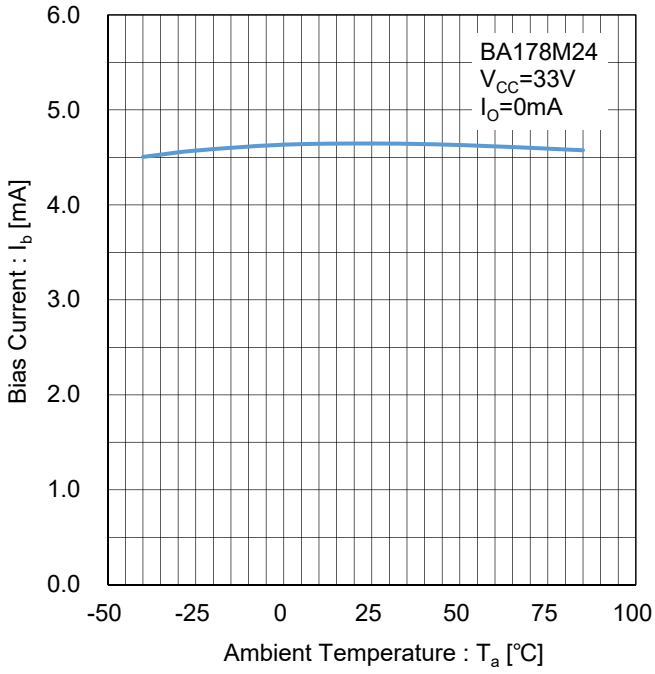


Figure 129. Bias Current vs Temperature
Test Circuit I

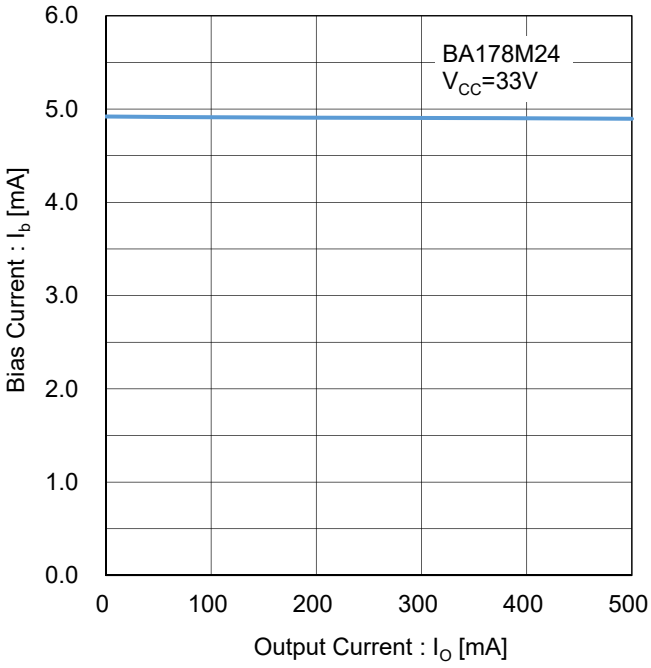


Figure 130. Bias Current vs Output Current
Test Circuit J

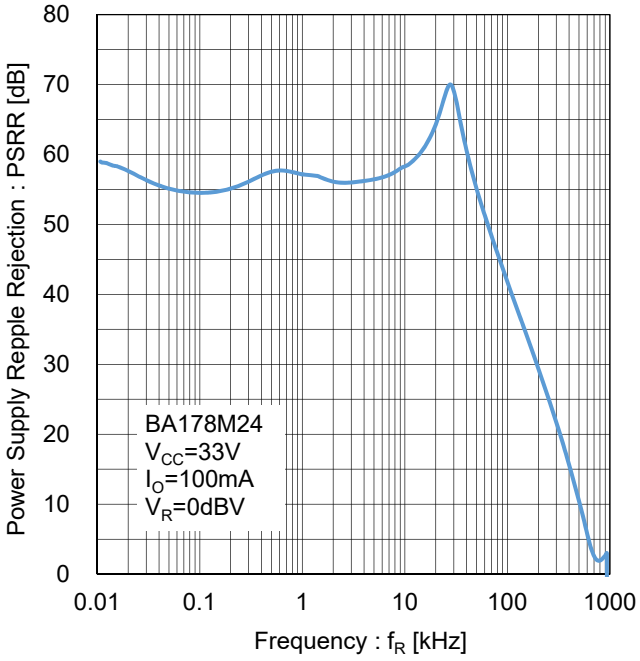


Figure 131. Ripple Rejection
Test Circuit K

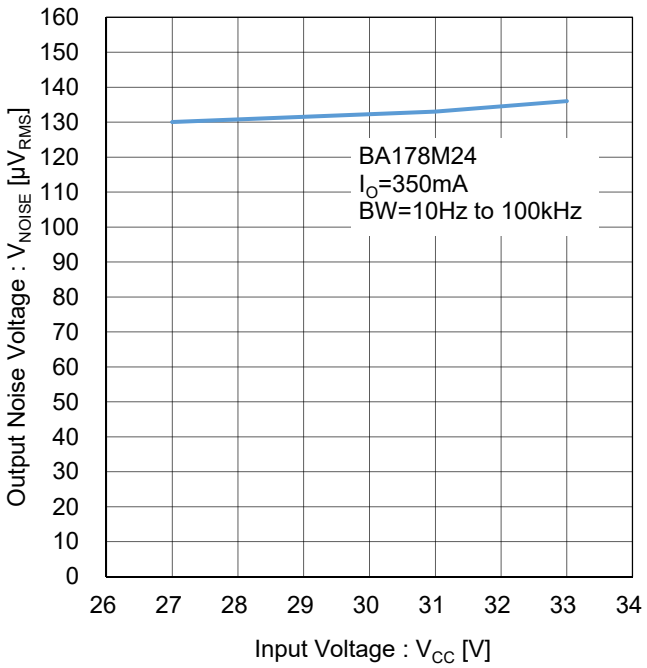
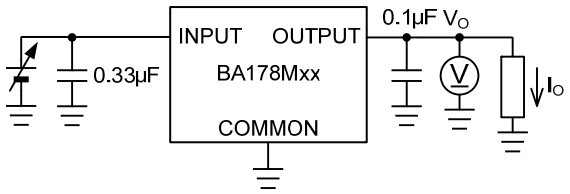
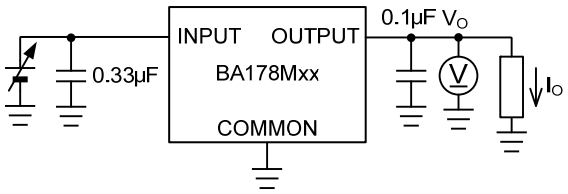


Figure 132. Output Noise Voltage
Test Circuit L

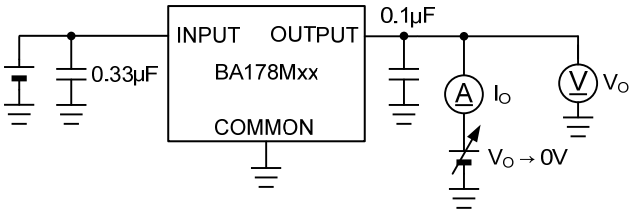
Test Circuits



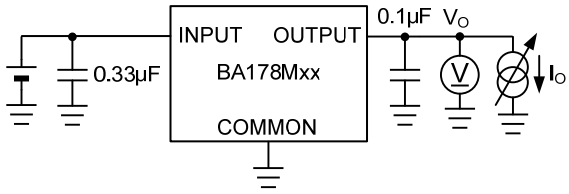
Test Circuit A. Output Voltage vs Input Voltage



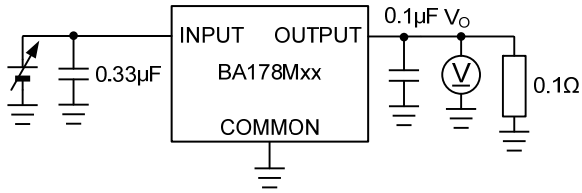
Test Circuit B. Line Regulation



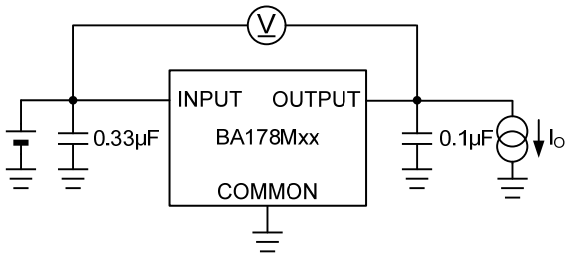
Test Circuit C. Overcurrent Protection



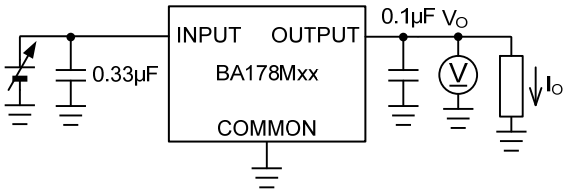
Test Circuit D. Load Regulation



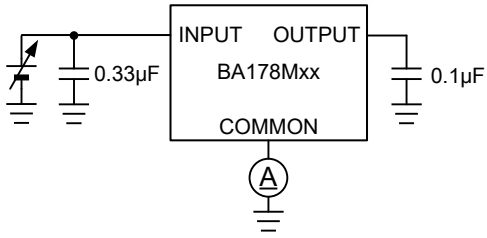
Test Circuit E. Output Short Current vs Input Voltage



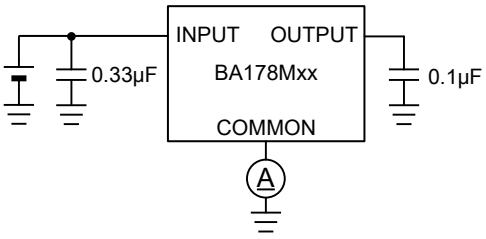
Test Circuit F. Dropout Voltage vs Output Current



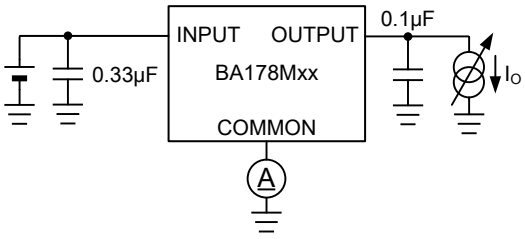
Test Circuit G. Output Voltage Temperature Stability



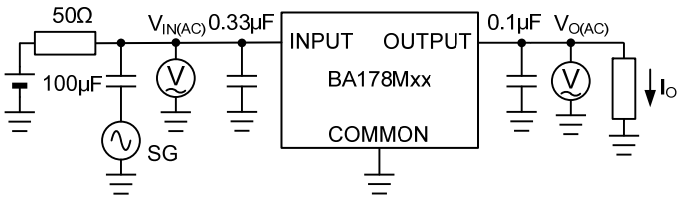
Test Circuit H. Bias Current vs Input Voltage



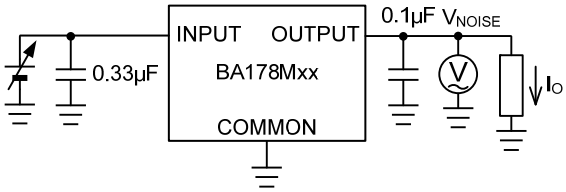
Test Circuit I. Bias Current vs Temperature



Test Circuit J. Bias Current vs Output Current



Test Circuit K. Ripple Rejection



Test Circuit L. Output Noise Voltage

Notice

Precaution on using ROHM Products

1. Our Products are designed and manufactured for application in ordinary electronic equipments (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment (Note 1), transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
   [a] Installation of protection circuits or other protective devices to improve system safety
   [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure

3. Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
   [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
   [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
   [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl_2, H_2S, NH_3, SO_2, and NO_2
   [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
   [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
   [f] Sealing or coating our Products with resin or other coating materials
   [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
   [h] Use of the Products in places subject to dew condensation

4. The Products are not subject to radiation-proof design.

5. Please verify and confirm characteristics of the final or mounted products in using the Products.

6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7. De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.

8. Confirm that operation temperature is within the specified range described in the product specification.

9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
   [a] the Products are exposed to sea winds or corrosive gases, including Cl2, H2S, NH3, SO2, and NO2
   [b] the temperature or humidity exceeds those recommended by ROHM
   [c] the Products are exposed to direct sunshine or condensation
   [d] the Products are exposed to high Electrostatic

2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.

3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

Precaution for Product Label

A two-dimensional barcode printed on ROHM Products label is for ROHM's internal use only.

Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

Precaution for Foreign Exchange and Foreign Trade act

Since concerned goods might be fallen under listed items of export control prescribed by Foreign exchange and Foreign trade act, please consult with ROHM in case of export.

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