

ISL80136EVAL1Z, ISL80138EVAL1Z

Evaluation Board

AN1784  
Rev 0.00  
May 19, 2015

**Description**

The ISL80136EVAL1Z and ISL80138EVAL1Z evaluation boards are designed to demo the performance of these high voltage linear regulators. The evaluation boards are available with jumpers to set output voltage from 2.5V to 12V for easy evaluation by configuring a single resistor. The evaluation boards can also be configured to give a specific output voltage.

**Specification**

These boards have been configured and optimized for the following operating conditions:

- $V_{IN}$  = 6V to 40V
- $V_{OUT}$  = 2.5V to 12V
- $I_{OUT}$  maximum is 50mA for ISL80136 and 150mA for ISL80138.
- Selectable output by setting jumper pins JP2 through JP8.
- JP1 uses for setting custom output voltage.

**Features**

- Wide  $V_{IN}$  range of 6V to 40V
- Adjustable output voltage from 2.5V to 12V
- $I_{OUT}$  is 50mA for ISL80136 and 150mA for ISL80138
- Ultra low 18 $\mu$ A typical quiescent current
- $\pm 1\%$  accurate voltage reference
- Overcurrent protection
- Over-temperature/thermal protection

**References**

[ISL80136 Datasheet](#)

[ISL80138 Datasheet](#)

**Ordering Information**

| PART NUMBER    | DESCRIPTION                                  |
|----------------|--|
| ISL80136EVAL1Z | 40V Linear Regulator, 50mA Evaluation Board  |
| ISL80138EVAL1Z | 40V Linear Regulator, 150mA Evaluation Board |



FIGURE 1. ISL80138EVAL1Z EVALUATION BOARD

## Test Steps

1. Place jumper in proper location to set output voltage.
2. Set jumper JP9 shorting pins 1 and 2 to enable device.
3. Connect supply +6V to +40V to VIN and GND terminals.
4. Connect VOUT to load or multimeter to evaluate output.

## Functional Description

The ISL80136EVAL1Z and ISL80138EVAL1Z provide a simple platform to evaluate performance of ISL80136 and ISL80138. The ISL80136 and ISL80138 are high input voltage, low quiescent current linear regulators. The ISL80136 can output up to 50mA while the ISL80138 can provide 150mA current with only 18µA typical quiescent current. Both regulators feature a wide input voltage range of 6V to 40V. The output voltage is adjustable from 2.5V to 12V through a feedback resistor divider. The ISL80136 and ISL80138 are ideal for applications that need the load to operate under “always-on” or “stay alive” conditions of a high input voltage or under load dump conditions where the system voltage may peak much higher than normal. In addition, the low dropout performance and high PSRR make these regulators a good choice as a post regulator for a noisy voltage bus.

The ISL80136EVAL1Z and ISL80138EVAL1Z evaluation boards are setup so that the user can easily configure the device for a specific output voltage with a single jumper. Jumper pins JP4 through JP7 will set the output voltage through a discrete range of 2.5V to 12V. When jumper JP1 is set, the user must populate R<sub>1</sub> with a resistor to get a custom output voltage.

The regulator uses a voltage divider to set the feedback reference for setting output voltage. The voltage at the output of the linear regulator when setting a custom output voltage is defined by [Equation 1](#). R<sub>9</sub> is set on the evaluation board at 15kΩ. Rearranging for R<sub>1</sub> yields [Equation 2](#).

$$V_{OUT} = 1.223V \times \left( \frac{R_9}{R_1} + 1 \right) \quad (\text{EQ. 1})$$

$$R_1 = \frac{18.3k\Omega}{V_{OUT} - 1.223} \quad (\text{EQ. 2})$$

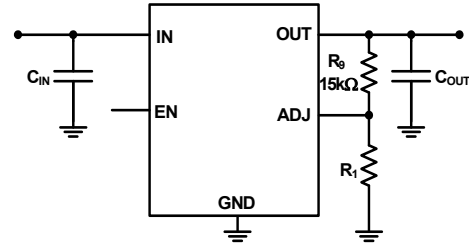


FIGURE 2. OUTPUT VOLTAGE SETTING

| EVALUATION BOARD OUTPUT VOLTAGE |  |                |
|---------------------------------|--|----------------|
| V <sub>OUT</sub> (V)            | RSET   | JUMPER SETTING |
| 2.5                             | 14kΩ   | JP4            |
| 3.3                             | 8.66kΩ   | JP5            |
| 5                               | 4.75kΩ   | JP6            |
| 12                              | 1.65kΩ   | JP7            |
| CUSTOM                          | R <sub>1</sub> = 18.3kΩ/(V <sub>OUT</sub> - 1.223) | JP1            |

## PCB Layout Guidelines

A good PCB layout is important to achieve expected performance. Consideration should be taken when placing the components and routing the trace to minimize the ground impedance, and keep the parasitic inductance low. The input and output capacitors should have a good ground connection and be placed as close to the IC as possible. The ADJ feedback trace should be away from other noisy traces. Connect the exposed pad to the ground plane using as many vias as possible within the pad for the best thermal relief.

## ISL80136EVAL1Z Schematic

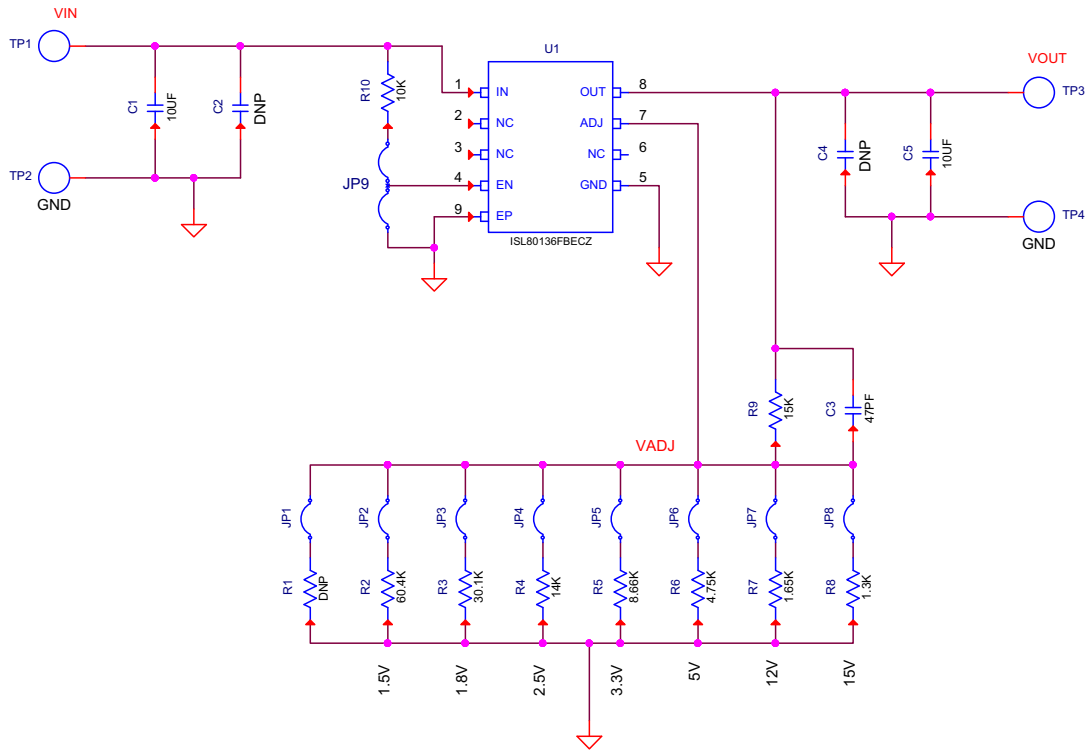


FIGURE 3. ISL80136EVAL1Z SCHEMATIC

## ISL80138EVAL1Z Schematic

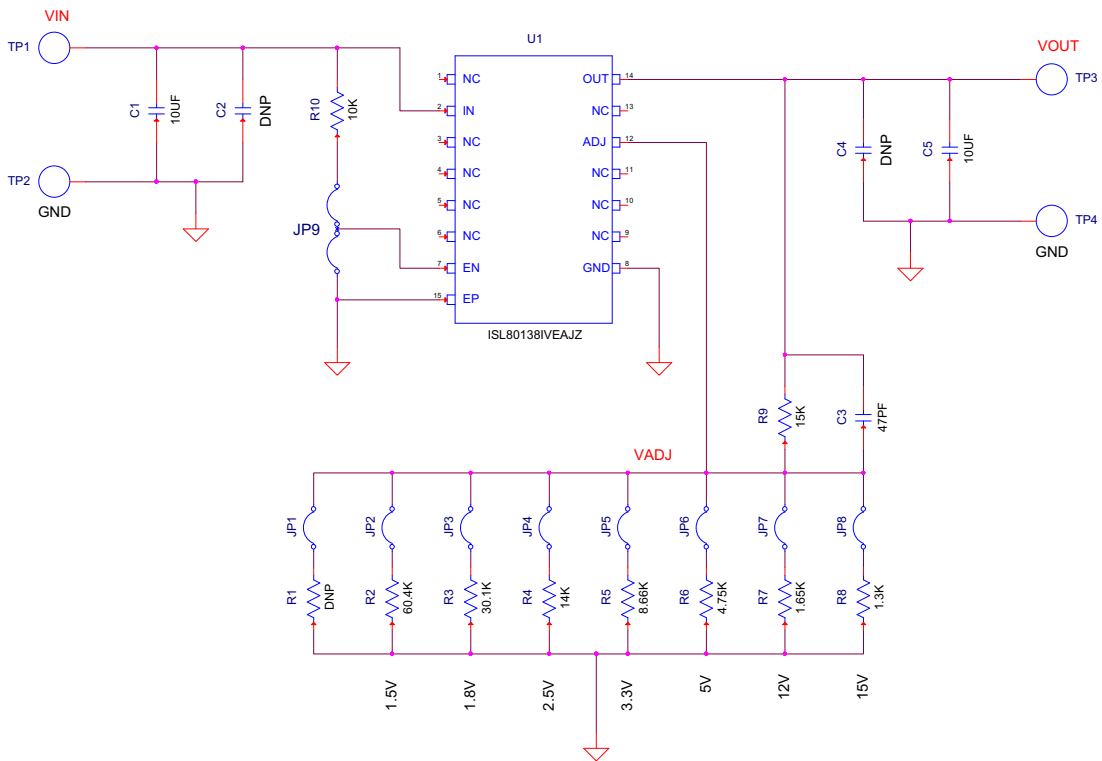


FIGURE 4. ISL80138EVAL1Z SCHEMATIC

## Bill of Materials

| PART NUMBER          | QTY | UNITS | REFERENCE DESIGNATOR                   | DESCRIPTION   | MANUFACTURER | MANUFACTURER PART |
|----------------------|-----|-------|--|---|--------------|-------------------|
| H1045-00470-50V5-T   | 1   | ea.   | C3                                     | CAP, SMD, 0603, 47pF, 50V, 5%, COG, NP0, ROHS           | AVX          | 06035A470JAT2A    |
| H1065-00106-50V10-T  | 4   | ea.   | C1, C2, C4, C5                         | CAP, SMD, 1206, 10µF, 50V, 10%, X5R, ROHS               | TDK          | C3216X5R1H106K    |
| 1514-2               | 4   | ea.   | TP1, TP2, TP3, TP4                     | CONN-TURRET, TERMINAL POST, TH, ROHS                    | KEYSTONE     | 1514-2            |
| 68000-236HLF-1X3     | 1   | ea.   | JP9                                    | CONN-HEADER, 1x3, BREAKAWY 1X36, 2.54mm, ROHS           | BERG/FCI     | 68000-236HLF      |
| 69190-202HLF         | 8   | ea.   | JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8 | CONN-HEADER, 1X2, RETENTIVE, 2.54mm, 0.230X 0.120, ROHS | BERG/FCI     | 69190-202HLF      |
| SPC02SYAN            | 2   | ea.   | JP6, JP9-Pins 1 and 2                  | CONN-JUMPER, SHORTING, 2PIN, BLACK, GOLD, ROHS          | SULLINS      | SPC02SYAN         |
| ISL80136IBEAJZ       | 1   | ea.   | U1                                     | IC-40V LDO ADJ. LINEAR REGULATOR, 8P, EPSONIC, ROHS     | INTERSIL     | ISL80136IBEAJZ    |
| ISL80138IVEAJZ       | 1   | ea.   | U1                                     | IC-40V LDO ADJ. LINEAR REGULATOR, 14P, HTSSOP, ROHS     | INTERSIL     | ISL80138IVEAJZ    |
| H2511-01002-1/10W1-T | 1   | ea.   | R10                                    | RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS                | KOA          | RK73H1JT1002F     |
| H2511-01301-1/10W1-T | 1   | ea.   | R8                                     | RES, SMD, 0603, 1.3k, 1/10W, 1%, TF, ROHS               | VISHAY/DALE  | CRCW06031K30FKTA  |
| H2511-01402-1/10W1-T | 1   | ea.   | R4                                     | RES, SMD, 0603, 14k, 1/10W, 1%, TF, ROHS                | VENKEL       | CR0603-10W-1402FT |
| H2511-01502-1/10W1-T | 1   | ea.   | R9                                     | RES, SMD, 0603, 15k, 1/10W, 1%, TF, ROHS                | PANASONIC    | ERJ-3EKF1502V     |
| H2511-01651-1/10W1-T | 1   | ea.   | R7                                     | RES, SMD, 0603, 1.65k, 1/10W, 1%, TF, ROHS              | PANASONIC    | ERJ-3EKF1651V     |
| H2511-03012-1/10W1-T | 1   | ea.   | R3                                     | RES, SMD, 0603, 30.1k, 1/10W, 1%, TF, ROHS              | VENKEL       | CR0603-10W-3012FT |
| H2511-04751-1/10W1-T | 1   | ea.   | R6                                     | RES, SMD, 0603, 4.75k, 1/10W, 1%, TF, ROHS              | VENKEL       | CR0603-10W-4751FT |
| H2511-06042-1/10W1-T | 1   | ea.   | R2                                     | RES, SMD, 0603, 60.4k, 1/10W, 1%, TF, ROHS              | YAGEO        | RC0603FR-0760K4L  |
| H2511-08661-1/10W1-T | 1   | ea.   | R5                                     | RES, SMD, 0603, 8.66k, 1/10W, 1%, TF, ROHS              | PANASONIC    | ERJ-3EKF8661V     |
| H2511-DNP            | 0   | ea.   | R1                                     | RES, SMD, 0603, DNP-PLACE HOLDER, ROHS                  |              |                   |

## Board Layouts

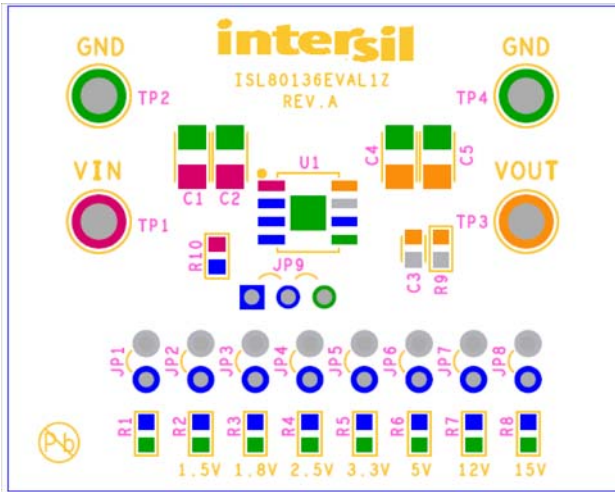


FIGURE 5. ISL80136EVAL1Z SILKSCREEN TOP

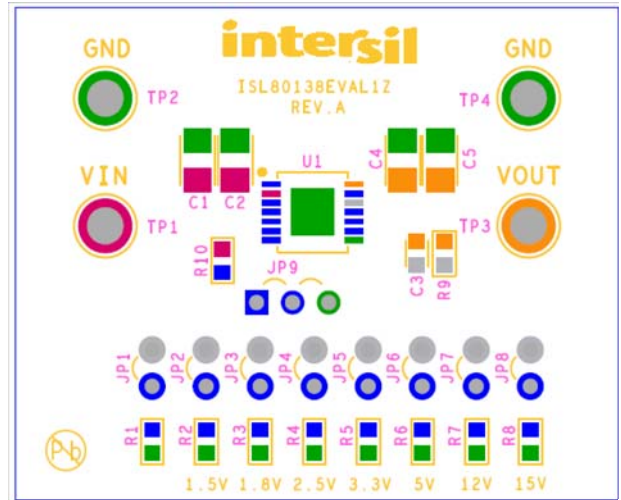


FIGURE 6. ISL80138EVAL1Z SILKSCREEN TOP

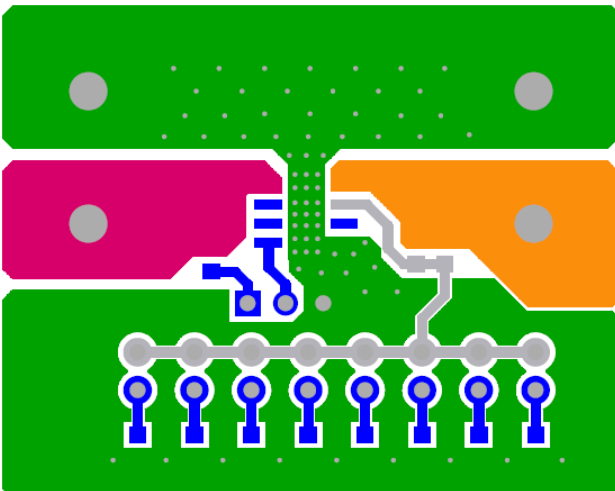


FIGURE 7. ISL80136EVAL1Z TOP

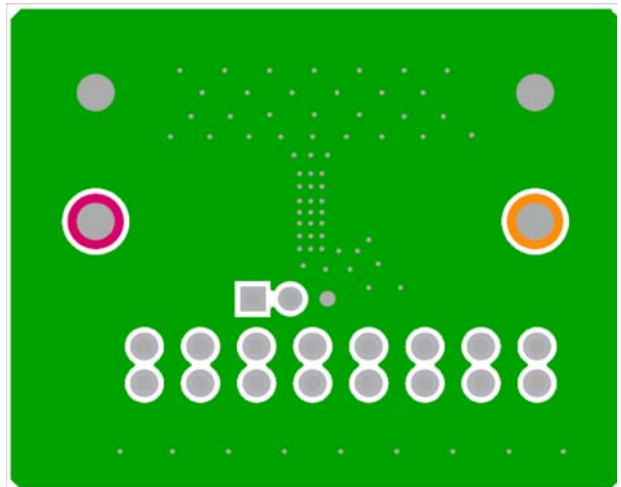


FIGURE 8. ISL80136EVAL1Z BOTTOM

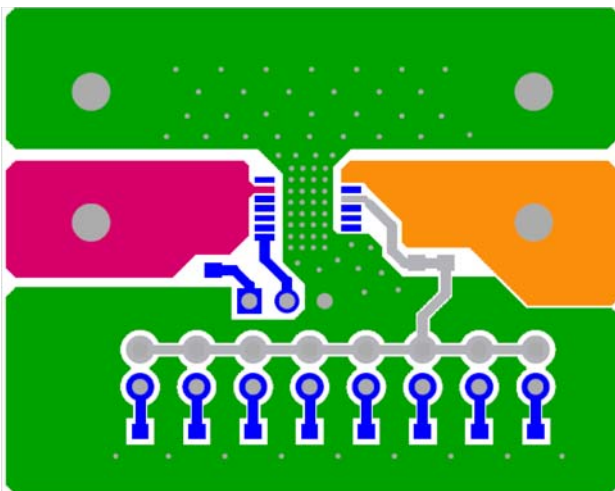


FIGURE 9. ISL80138EVAL1Z TOP

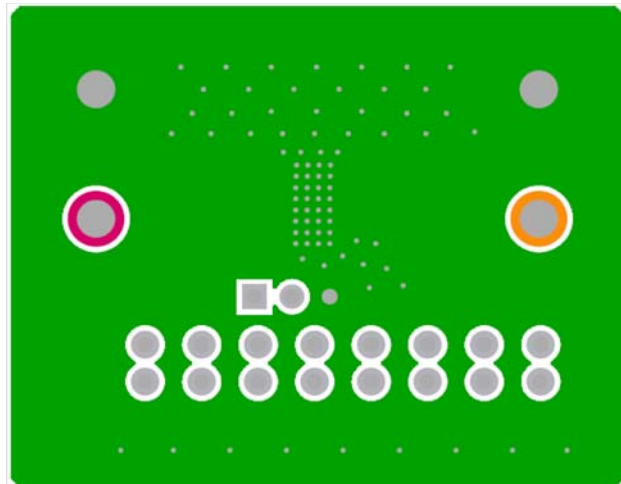


FIGURE 10. ISL80138EVAL1Z BOTTOM

## Typical Performance Curves

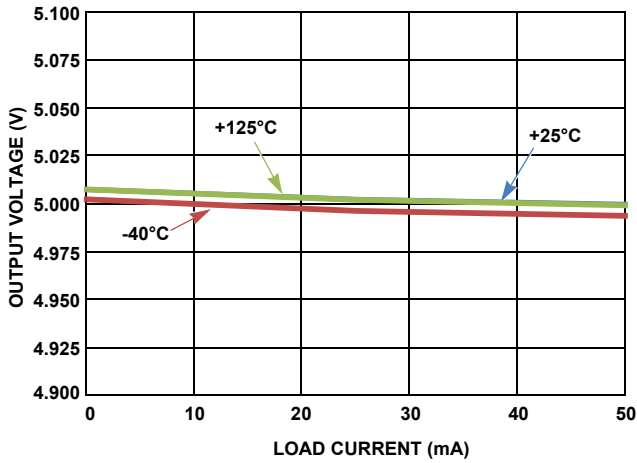


FIGURE 11. ISL80136 OUTPUT VOLTAGE VS LOAD CURRENT

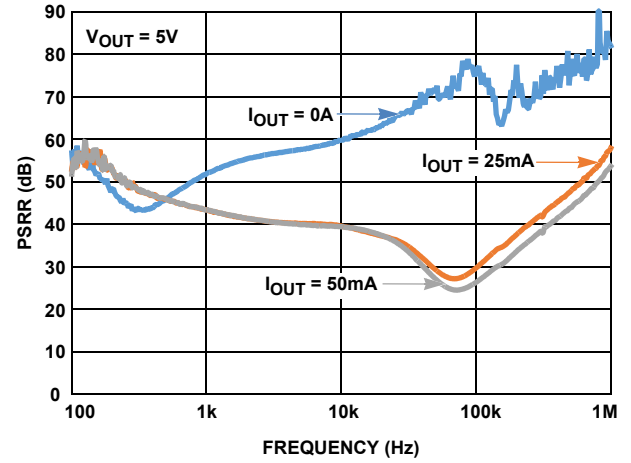


FIGURE 12. ISL80136 PSRR vs FREQUENCY FOR VARIOUS LOAD CURRENT,  $V_{OUT} = 5V$

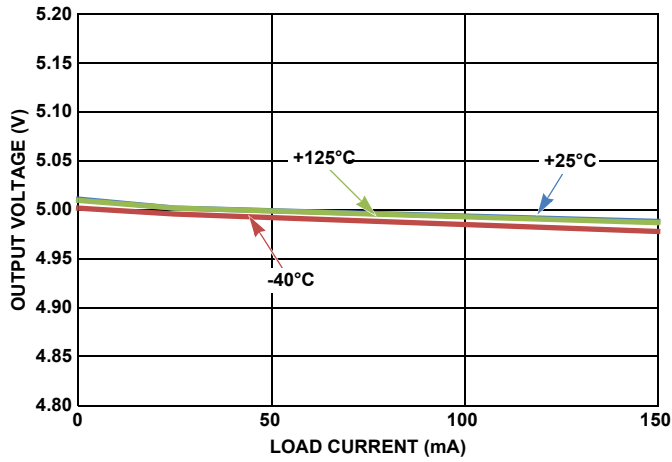


FIGURE 13. ISL80138 OUTPUT VOLTAGE vs LOAD CURRENT

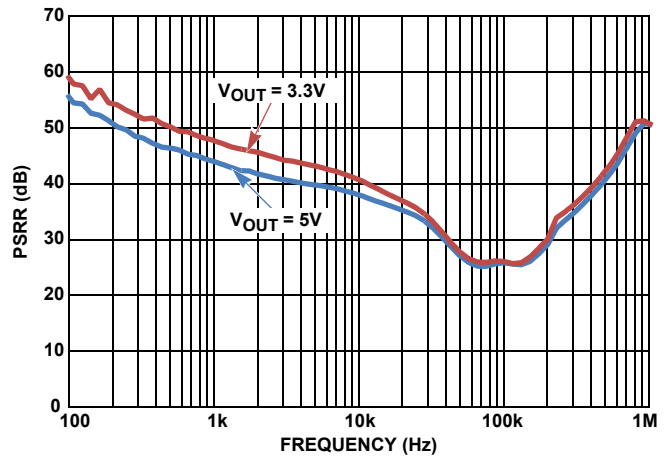


FIGURE 14. ISL80138 PSRR vs FREQUENCY FOR VARIOUS OUTPUT VOLTAGES, (LOAD = 150MA)

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