

# LTC4415EMSE

## Dual 4A Ideal Diodes with Adjustable Current Limit

### DESCRIPTION

Demonstration circuit 1819A features the LTC<sup>®</sup>4415EMSE dual ideal diodes. Each independent ideal diode can be used to replace a standard diode for improved low forward drop in applications requiring maximum headroom and overall system efficiency.

The input supply voltage ranges are from 1.7V to 5.5V for each input/output pair. As initially configured, LTC4415 can provide a maximum current limit of 4A for each diode, but is jumper-selectable up to 6A (internal current limit). The voltage of the current limit pins, CLIM1 and CLIM2, can also be monitored for a scaled representation of the output current.

For evaluation, each diode can be controlled by the ENABLE CONTROL jumper, JP1, or by the enable input pins,

EN1 and  $\overline{\text{EN2}}$ . As initially configured, by setting to BOTH the user can apply input voltages and loads on each diode independently. Selecting PRIORITY allows the LTC4415 to automatically switch over between inputs when the proper input voltage threshold on IN1 is achieved.

Status and warning LEDs and test points are provided for the logic output pins STAT1, STAT2 and WARN1, WARN2, respectively.

Optionally, the LTC4415EDHC version can also be used for evaluation. It is a pin-compatible drop-in replacement.

**Design files for this circuit board are available at <http://www.linear.com/demo>**

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### PERFORMANCE SUMMARY (T<sub>A</sub> = 25°C)

| PARAMETER                | CONDITIONS                      | VALUE    |
|--------------------------|---------------------------------|----------|
| Minimum Input Voltage    | VINx                            | 1.7V     |
| Maximum Input Voltage    | VINx                            | 5.5V     |
| Maximum Output Current   | CLIMx Resistor-Adjustable       | 4A       |
|                          | CLIMx Internal Limit            | 6A       |
| CLIMx Clamp Voltage      | Current Limit                   | 0.5V     |
| Forward Voltage Drop     | VINx = 3.6V, IOUTx = 1A         | 50mV Typ |
| Reverse Turn-Off Voltage | VINx – VOUTx                    | –30mV    |
| Enable Threshold         | EN1 and $\overline{\text{EN2}}$ | 800mV    |

## QUICK START PROCEDURE

Demonstration circuit 1819A is easy to set up to evaluate the performance of the LTC4415. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below.

1. Set the jumpers as below:

| JP1  | JP2 | JP3 |
|------|-----|-----|
| BOTH | 4A  | 4A  |

2. With all power off, connect input 1 and 2 (VIN1 and VIN2) power supplies capable of at least 4A each, the loads (VOUT1 and VOUT2), and meters as shown in Figure 1.
3. Preset the system loads to 0A and the input supplies to 0V, 0A current limit.
4. Turn on the supplies, setting the current limit above 4A. Adjust the voltages to the desired value, up to 5.5V.
5. Turn on the loads and adjust as necessary.
6. Monitor CLIM1 and CLIM2 pin voltages for a scaled representation of the output currents.
7. Adjust the supply voltages further and observe how the output states change accordingly.  $\overline{\text{STAT1}}$  and  $\overline{\text{STAT2}}$  will change state if the input voltage drops below the UVLO threshold.
8. Adjust the loads into current limit and observe how the  $\overline{\text{WARN1}}$  and  $\overline{\text{WARN2}}$  states change accordingly.

### Optional

1. For prioritization enable switchover set jumper JP1 to PRIORITY.
2. For independent, external control of the enable pins, remove the shunt on jumper JP1. Apply the logic control signal on EN1 and  $\overline{\text{EN2}}$  as necessary.
3. With all power off, change the CLIM1 and CLIM2 settings on jumpers JP2 and JP3 for different current limits.
4. For load sharing or evaluation of the diode-OR function, connect the two diode outputs, OUT1 and OUT2, together. The source of highest voltage will appear at the output.
5. For independent path control from a common input, connect the two diode inputs, IN1 and IN2, together.

## QUICK START PROCEDURE

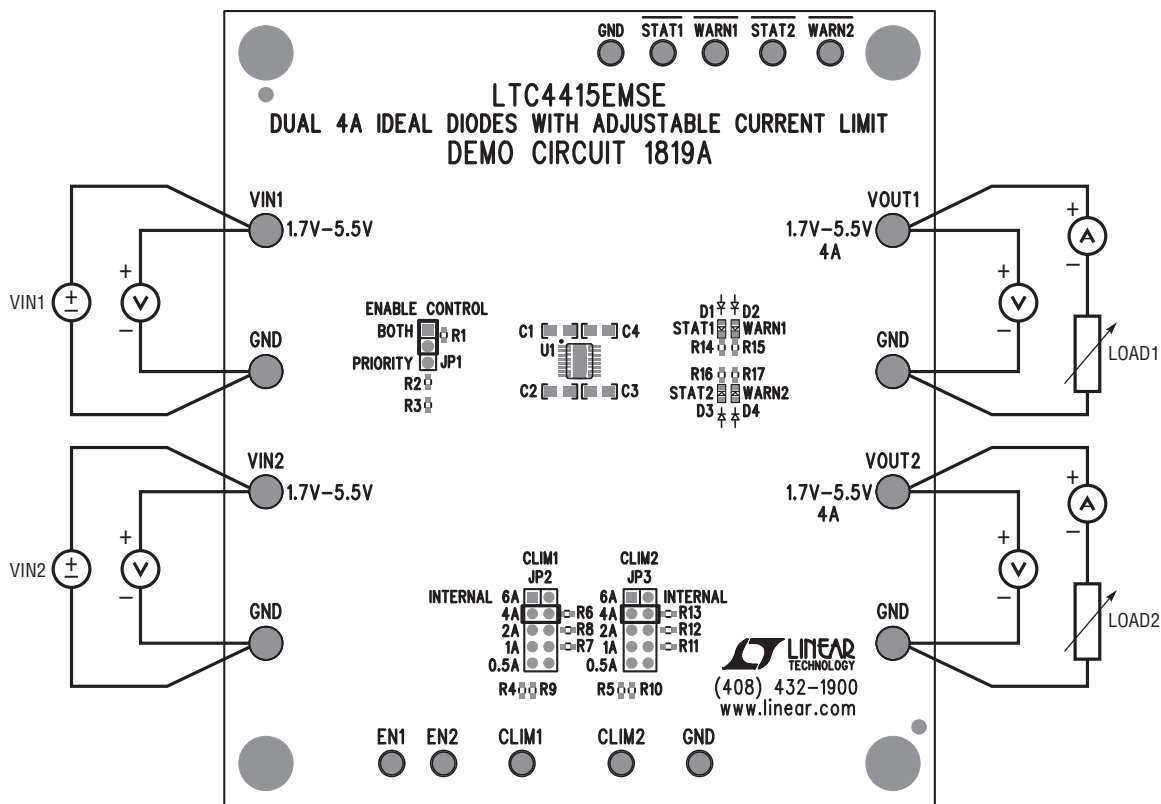


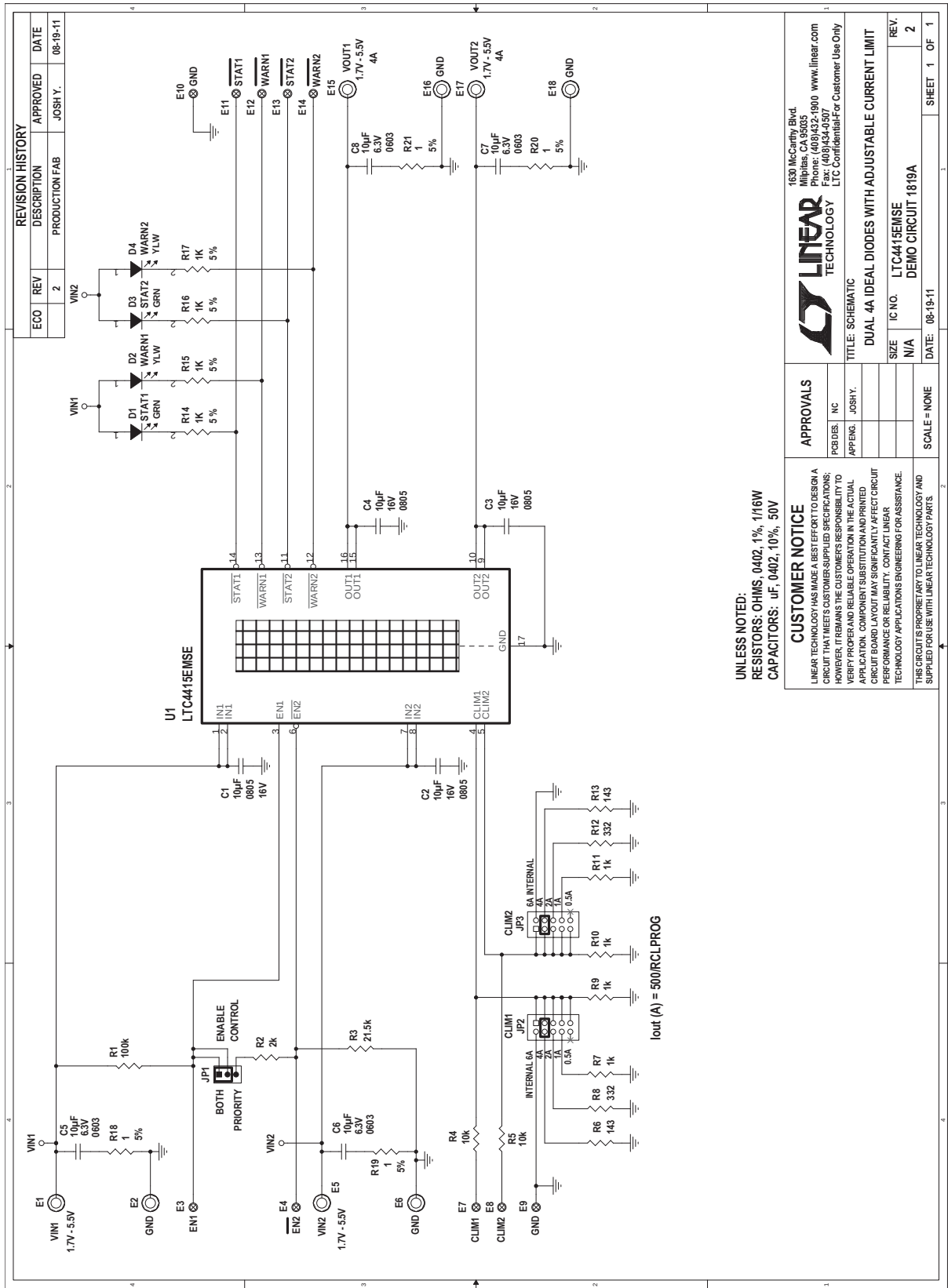
Figure 1. Proper Measurement Equipment Setup

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## PARTS LIST

| ITEM                                             | QTY | REFERENCE                              | PART DESCRIPTION                                  | MANUFACTURER/PART NUMBER          |
|--------------------------------------------------|-----|----------------------------------------|---------------------------------------------------|-----------------------------------|
| <b>Required Circuit Components</b>               |     |                                        |                                                   |                                   |
| 1                                                | 4   | C1, C2, C3, C4                         | CAP, CHIP, X5R, 10 $\mu$ F, $\pm$ 10%, 16V, 0805  | MURATA, GRM21BR61C106KE15L        |
| 2                                                | 1   | R1                                     | RES, CHIP, 100k, $\pm$ 1%, 1/16W, 0402            | VISHAY, CRCW0402100KFKED          |
| 3                                                | 1   | R2                                     | RES, CHIP, 2k, $\pm$ 1%, 1/16W, 0402              | VISHAY, CRCW04022K00FKED          |
| 4                                                | 1   | R3                                     | RES, CHIP, 21.5k, $\pm$ 1%, 1/10W, 0402           | VISHAY, CRCW040221K5FKED          |
| 5                                                | 2   | R9, R10                                | RES, CHIP, 1k, $\pm$ 1%, 1/16W, 0402              | VISHAY, CRCW04021K00FKED          |
| 6                                                | 1   | U1                                     | IC, LTC4415EMSE                                   | LINEAR TECH., LTC4415EMSE#PBF     |
| <b>Additional Demo Board Circuit Components</b>  |     |                                        |                                                   |                                   |
| 1                                                | 4   | C5, C6, C7, C8                         | CAP, CHIP, X5R, 10 $\mu$ F, $\pm$ 10%, 6.3V, 0603 | TDK, C1608X5R0J106K               |
| 2                                                | 2   | D1, D2                                 | LED, SMT, GREEN, 0603                             | LITE-ON, LTST-C190KGKT            |
| 3                                                | 2   | D3, D4                                 | LED, SMT, YELLOW, 0603                            | LITE-ON, LTST-C190YKT             |
| 4                                                | 2   | R4, R5                                 | RES, CHIP, 10k, $\pm$ 5%, 1/16W, 0402             | VISHAY, CRCW040210K0JNED          |
| 5                                                | 2   | R6, R13                                | RES, CHIP, 143 $\Omega$ , $\pm$ 1%, 1/16W, 0402   | VISHAY, CRCW0402143RFKED          |
| 6                                                | 2   | R8, R12                                | RES, CHIP, 332 $\Omega$ , $\pm$ 1%, 1/16W, 0402   | VISHAY, CRCW0402332RFKED          |
| 7                                                | 4   | R14, R15, R16, R17                     | RES, CHIP, 1k, $\pm$ 5%, 1/16W, 0402              | VISHAY, CRCW04021K00JNED          |
| 8                                                | 2   | R7, R11                                | RES, CHIP, 1k, $\pm$ 1%, 1/16W, 0402              | VISHAY, CRCW04021K00FKED          |
| 9                                                | 4   | R18, R19, R20, R21                     | RES, CHIP, 1 $\Omega$ , $\pm$ 5%, 1/16W, 0402     | VISHAY, CRCW04021R00JNED          |
| <b>Hardware/Components (For Demo Board Only)</b> |     |                                        |                                                   |                                   |
| 2                                                | 8   | E1, E2, E5, E8, E14, E15, E16, E17     | TEST POINT, TURRET, 0.094"                        | MILL-MAX, 2501-2-00-80-00-00-07-0 |
| 1                                                | 9   | E3, E4, E6, E7, E9, E10, E11, E12, E13 | TEST POINT, TURRET, 0.061"                        | MILL-MAX, 2308-2-00-80-00-00-07-0 |
| 3                                                | 1   | JP1                                    | 3 Pin Jumper, 2mm                                 | SAMTEC, TMM-103-02-L-S            |
| 4                                                | 2   | JP2, JP3                               | 2 $\times$ 5 Pin Jumper, 2mm                      | SAMTEC, TMM-105-02-L-D            |
| 5                                                | 3   | JP1-3                                  | SHUNT, 2mm                                        | SAMTEC, 2SN-KB-G                  |
| 6                                                | 4   |                                        | STAND-OFF, NYLON, 0.500"                          | KEYSTONE, 8833                    |

## SCHEMATIC DIAGRAM



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