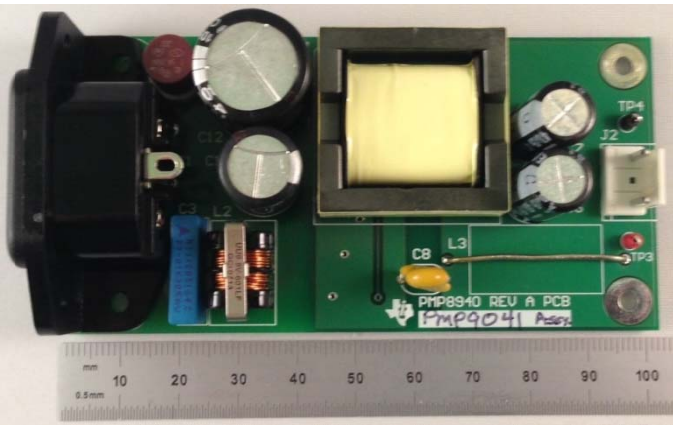
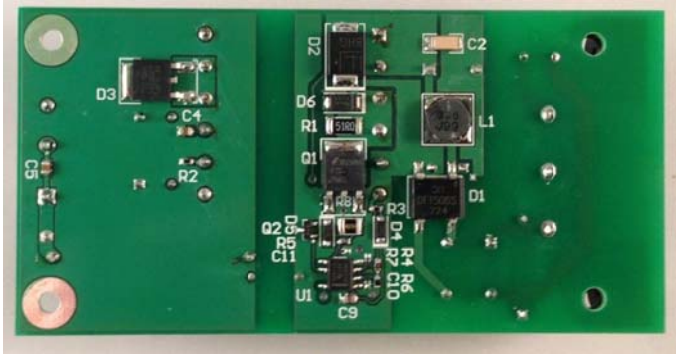
# 1 Photos

The photographs below show the PMP9041 Rev A prototype assembly. This circuit was built on a PMP8940 Rev A PCB.

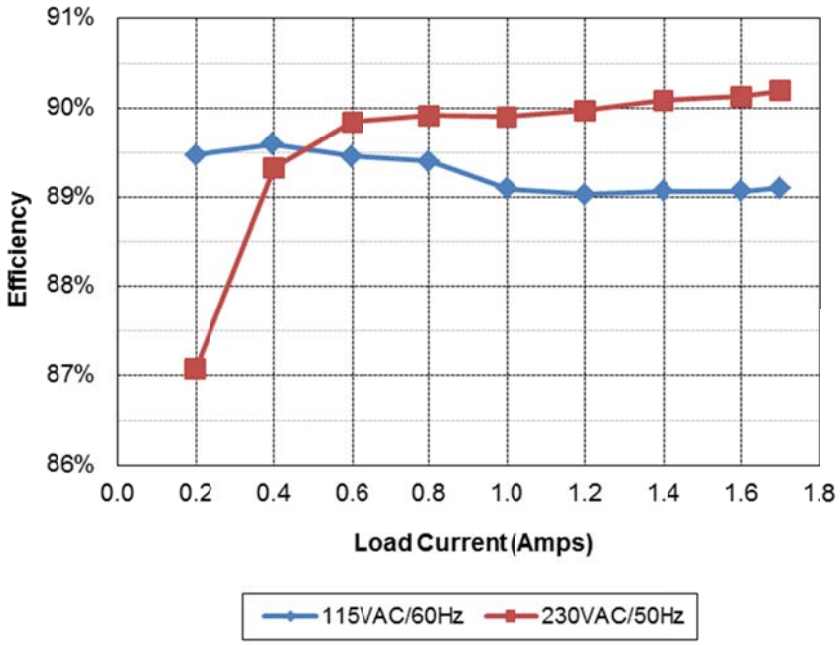



# 2 Standby Power

With no load attached to the output of the supply, the unit draws 37mW of input power with an 115VAC/60Hz input, and 46mW with a 230VAC/50Hz input.

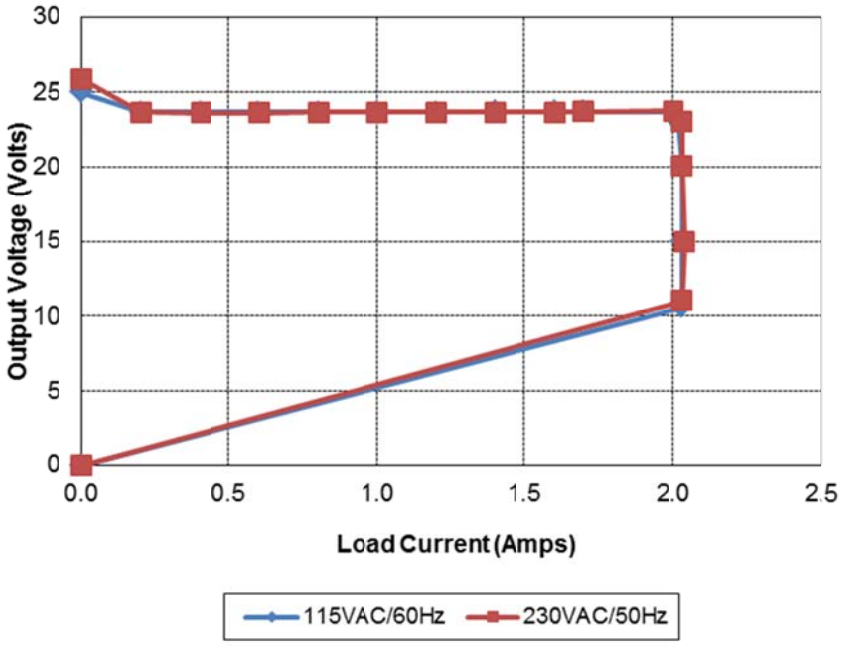
# 3 Efficiency



| 115VAC/60Hz | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Iout | Vout | Vin | Iin | Pin | PF | Pout | Losses | Efficiency |
| 0.000 | 25.03 | 115.0 | 0.0063 | 0.037 | | 0.00 | 0.04 | 0.0% |
| 0.200 | 23.71 | 115.0 | 0.127 | 5.30 | 0.36 | 4.74 | 0.56 | 89.5% |
| 0.399 | 23.69 | 115.0 | 0.220 | 10.55 | 0.41 | 9.45 | 1.10 | 89.6% |
| 0.599 | 23.70 | 115.0 | 0.305 | 15.87 | 0.45 | 14.20 | 1.67 | 89.5% |
| 0.800 | 23.69 | 115.0 | 0.384 | 21.20 | 0.48 | 18.95 | 2.25 | 89.4% |
| 1.000 | 23.68 | 115.0 | 0.460 | 26.58 | 0.50 | 23.68 | 2.90 | 89.1% |
| 1.199 | 23.70 | 115.0 | 0.534 | 31.92 | 0.52 | 28.42 | 3.50 | 89.0% |
| 1.399 | 23.72 | 115.0 | 0.606 | 37.26 | 0.54 | 33.18 | 4.08 | 89.1% |
| 1.600 | 23.74 | 114.9 | 0.678 | 42.65 | 0.55 | 37.98 | 4.67 | 89.1% |
| 1.699 | 23.73 | 114.9 | 0.712 | 45.25 | 0.55 | 40.32 | 4.93 | 89.1% |
| **230VAC/50Hz** | | | | | | | | |
| Iout | Vout | Vin | Iin | Pin | PF | Pout | Losses | Efficiency |
| 0.000 | 25.91 | 229.8 | 0.0098 | 0.046 | | 0.00 | 0.05 | 0.0% |
| 0.199 | 23.67 | 230.0 | 0.084 | 5.41 | 0.28 | 4.71 | 0.70 | 87.1% |
| 0.403 | 23.65 | 230.0 | 0.150 | 10.67 | 0.31 | 9.53 | 1.14 | 89.3% |
| 0.601 | 23.65 | 230.0 | 0.208 | 15.82 | 0.33 | 14.21 | 1.61 | 89.8% |
| 0.800 | 23.67 | 230.0 | 0.260 | 21.06 | 0.35 | 18.94 | 2.12 | 89.9% |
| 1.000 | 23.68 | 230.0 | 0.308 | 26.34 | 0.37 | 23.68 | 2.66 | 89.9% |
| 1.198 | 23.68 | 230.0 | 0.353 | 31.53 | 0.39 | 28.37 | 3.16 | 90.0% |
| 1.400 | 23.70 | 230.0 | 0.398 | 36.83 | 0.40 | 33.18 | 3.65 | 90.1% |
| 1.600 | 23.71 | 230.0 | 0.441 | 42.09 | 0.42 | 37.94 | 4.15 | 90.1% |
| 1.699 | 23.73 | 230.0 | 0.462 | 44.70 | 0.42 | 40.32 | 4.38 | 90.2% |

## 4 Current Limit

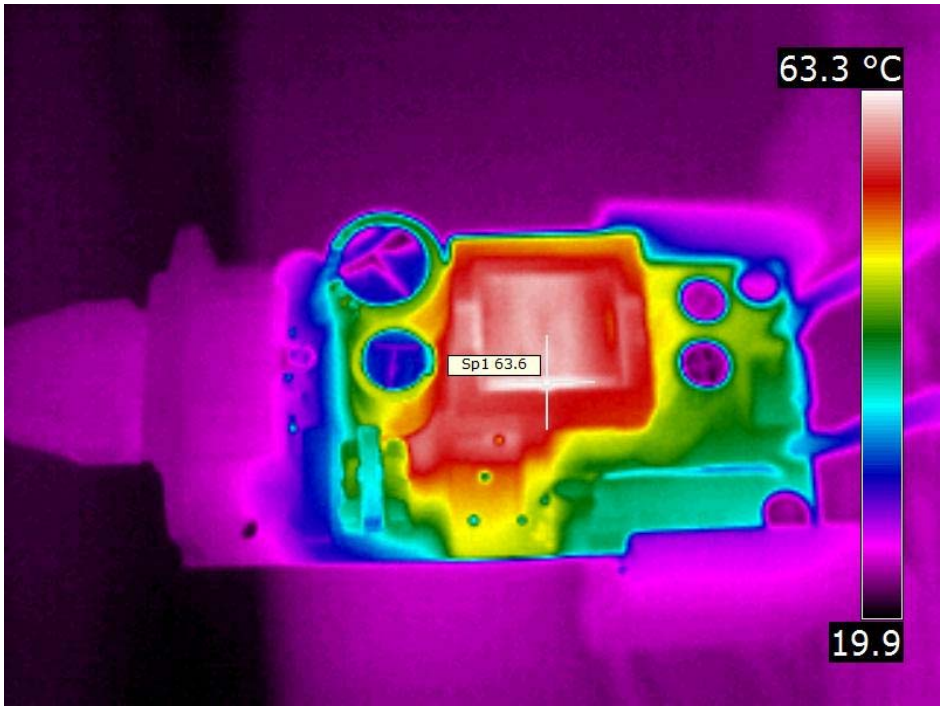
A plot of the output voltage versus load current is shown below.

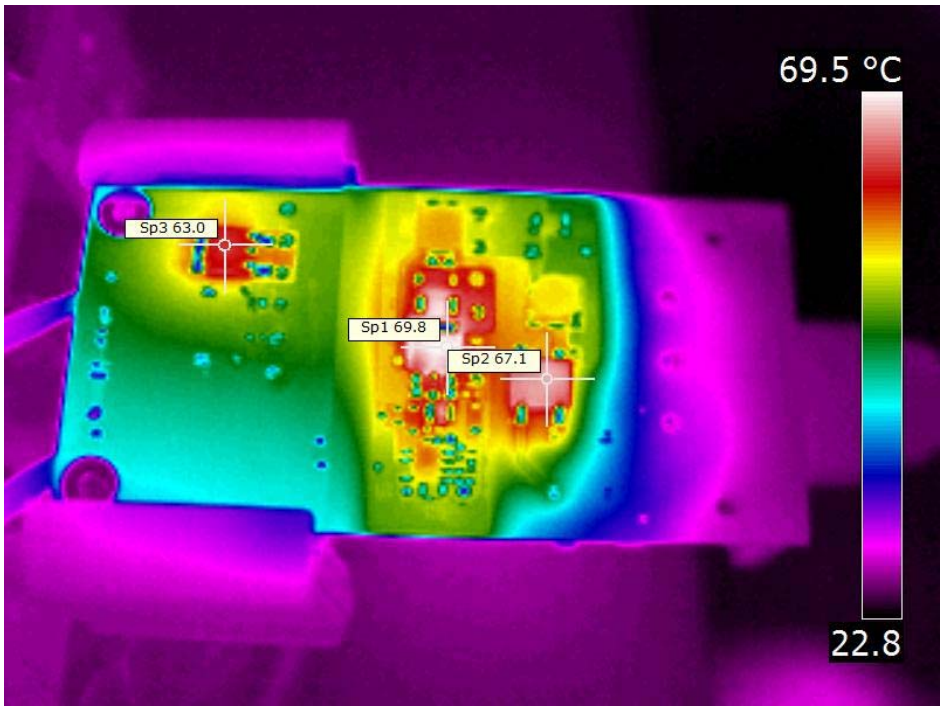


# 5 Thermal Images

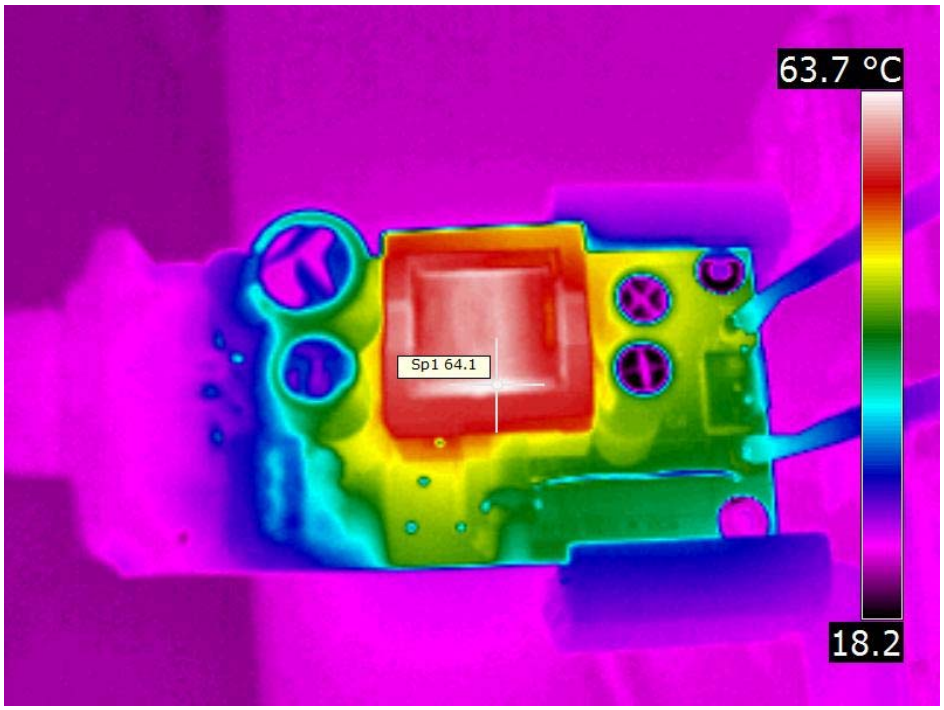
The ambient temperature was 25ºC. The output was loaded with 1.7A.

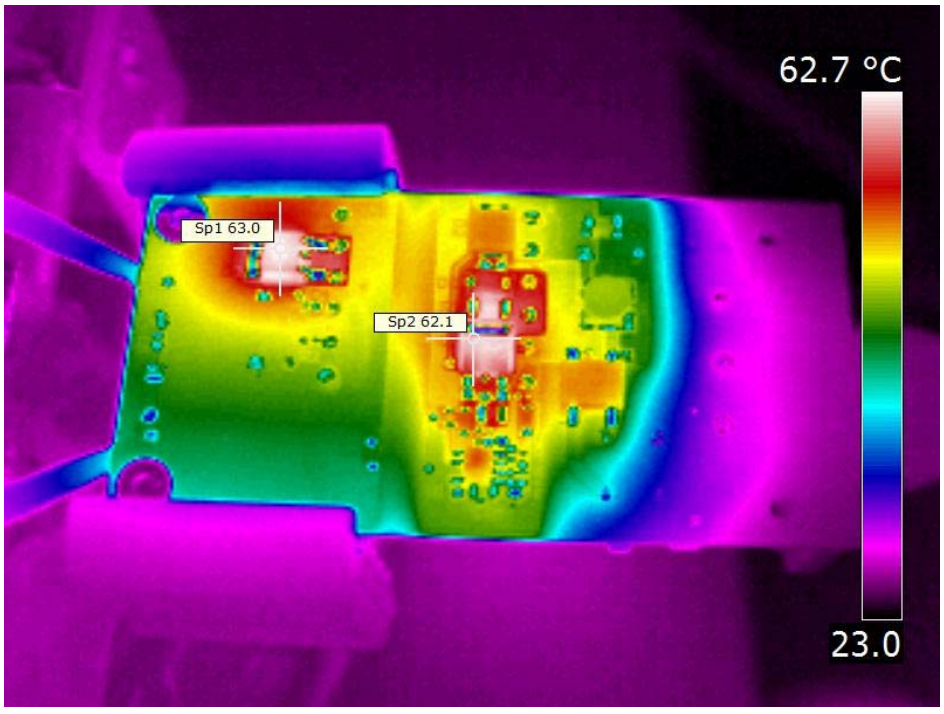
## *5.1 115VAC/60Hz Input*



### 5.2 230VAC/50Hz Input

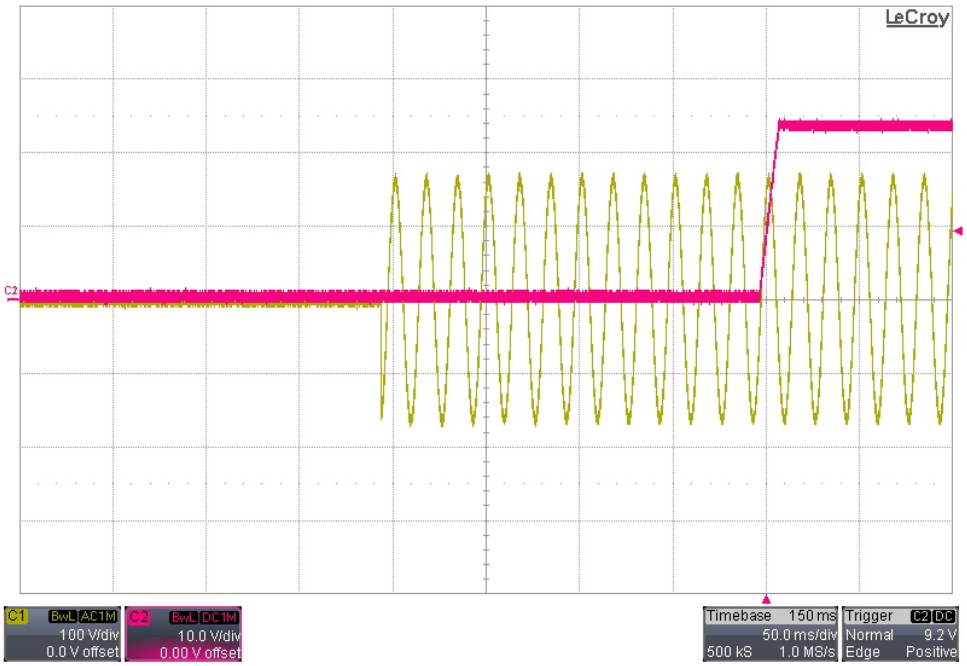


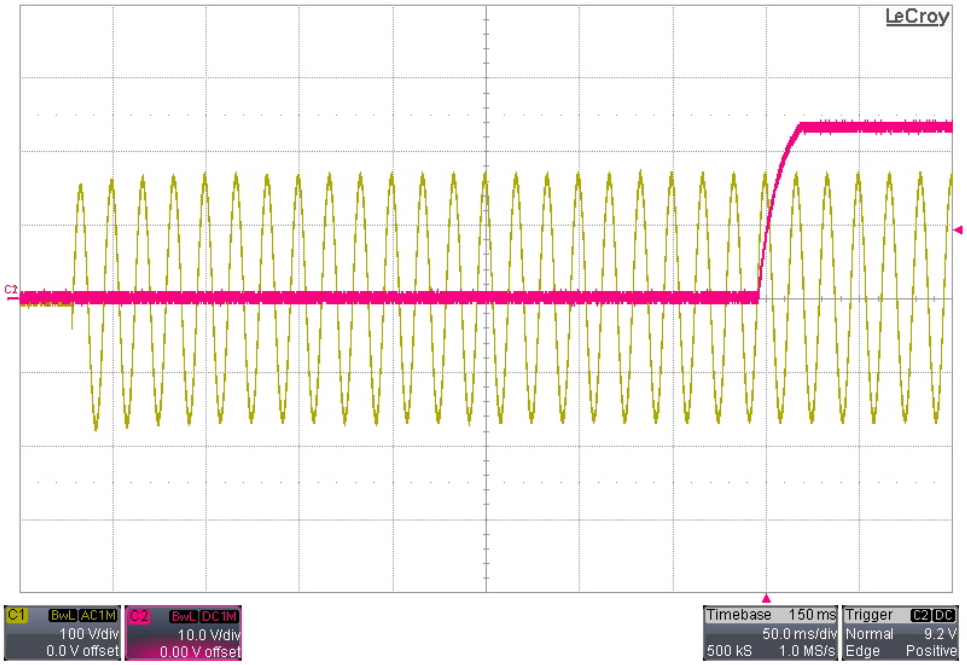
# 6 Startup

Channel 1 shows the AC input voltage. Channel 2 shows the output voltage.

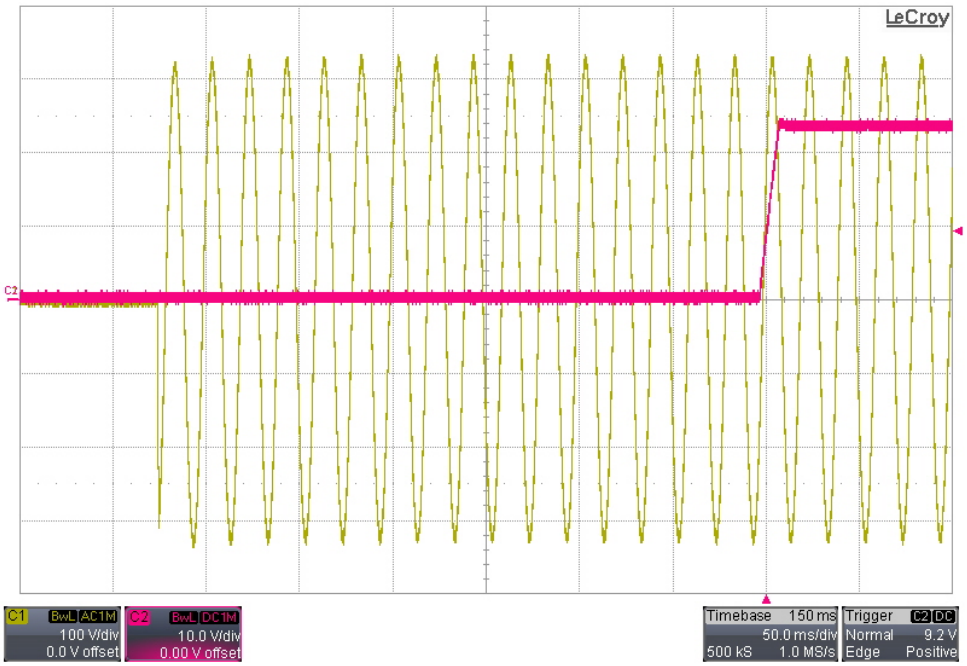
## 6.1 115VAC/60Hz Startup – 0A Load



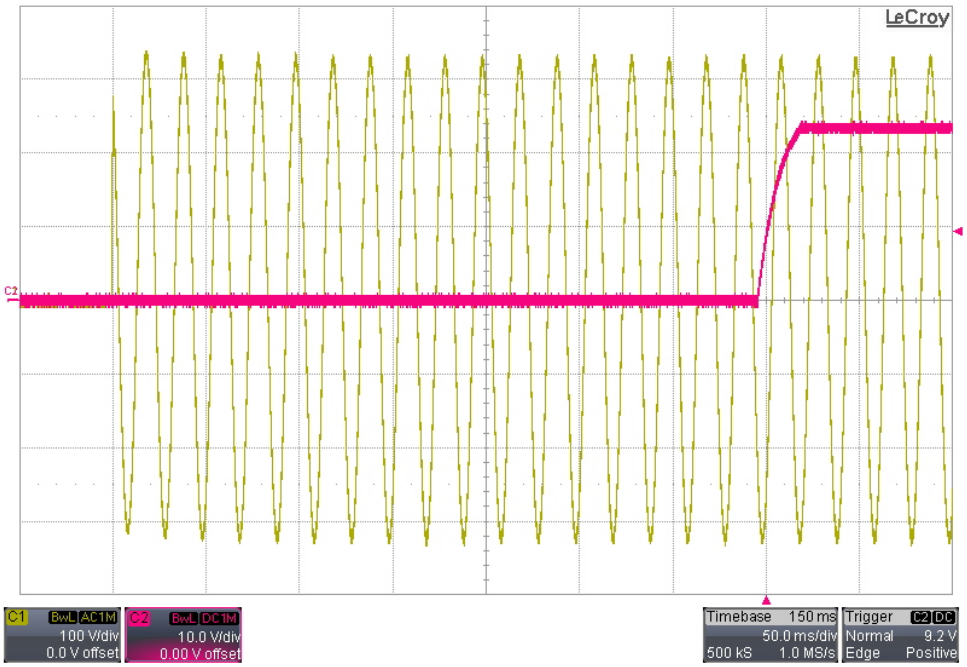

## 6.2 115VAC/60Hz Startup – 14Ω Load



### 6.3 230VAC/50Hz Startup – 0A Load



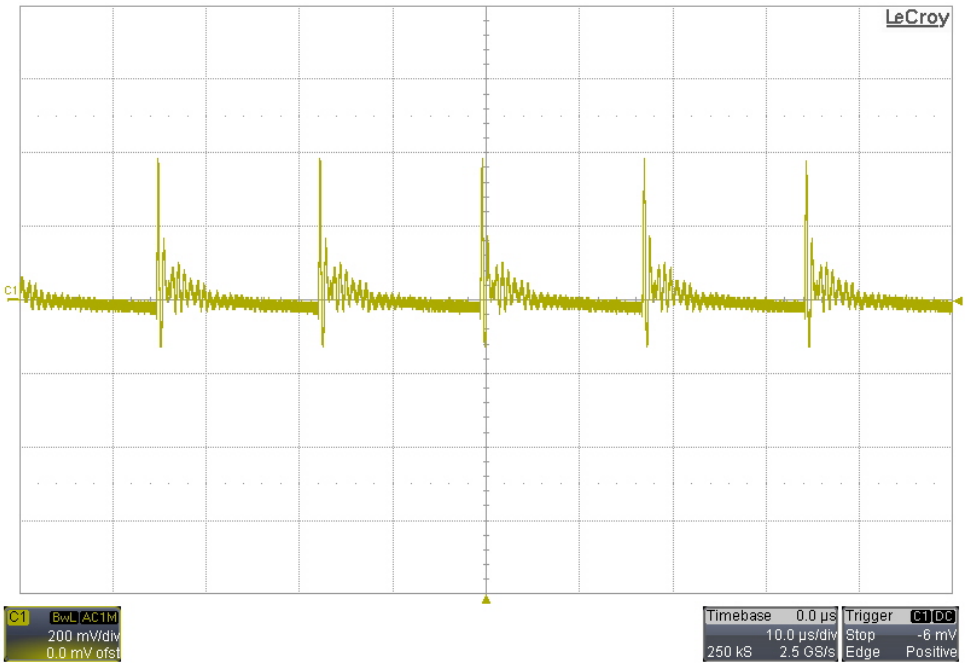

### 6.4 230VAC/50Hz Startup – 14Ω Load



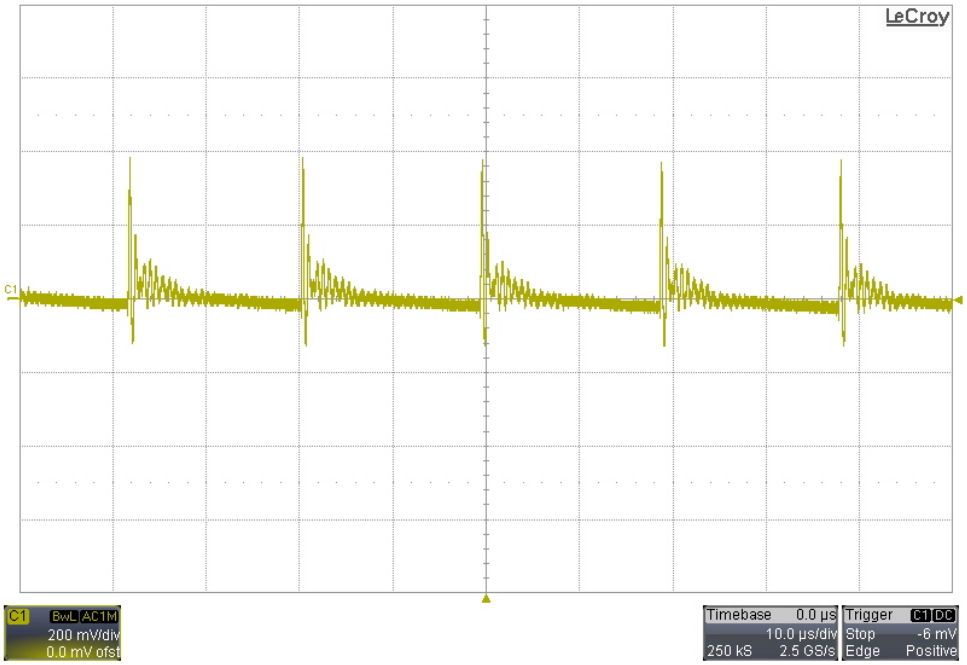
# 7 Output Ripple Voltage

The output was loaded with 1.7A.

## *7.1 115VAC/60Hz Input*

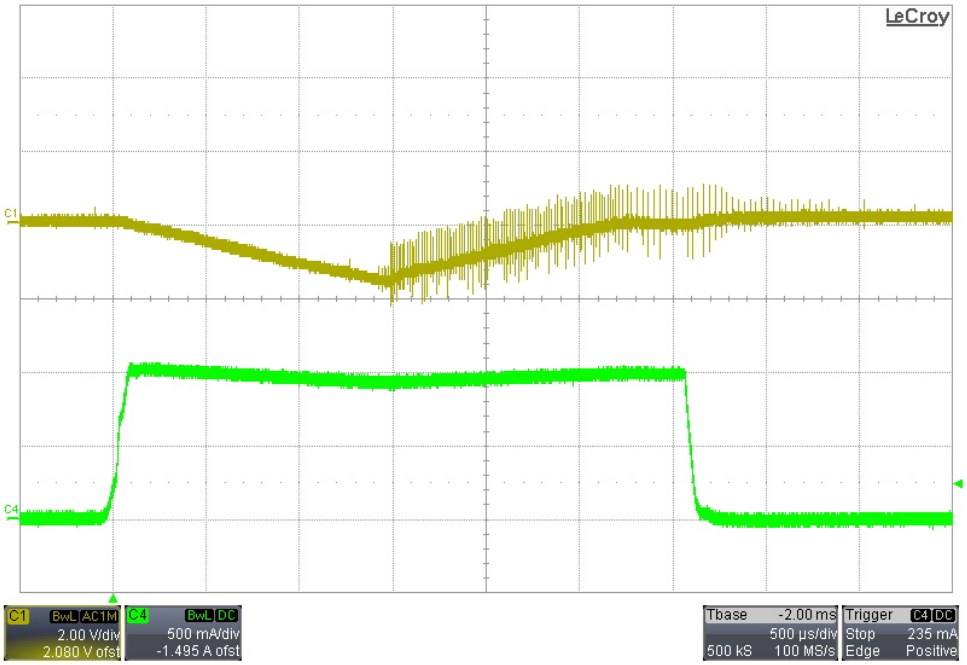



## *7.2 230VAC/50Hz Input*

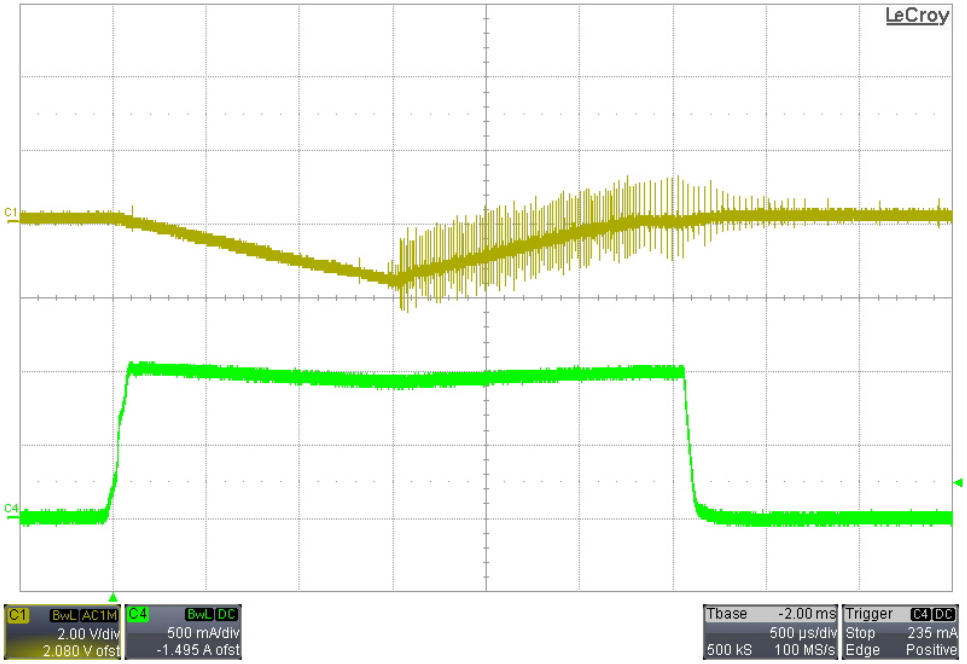


# 8 Load Transients

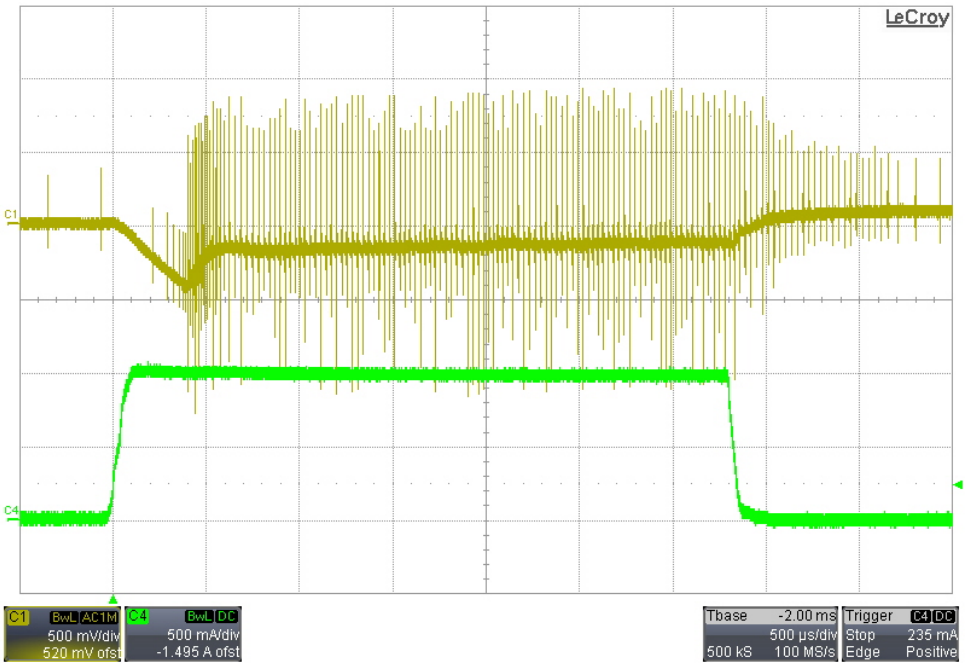
## 8.1 0A to 1A Transient – 115VAC/60Hz Input



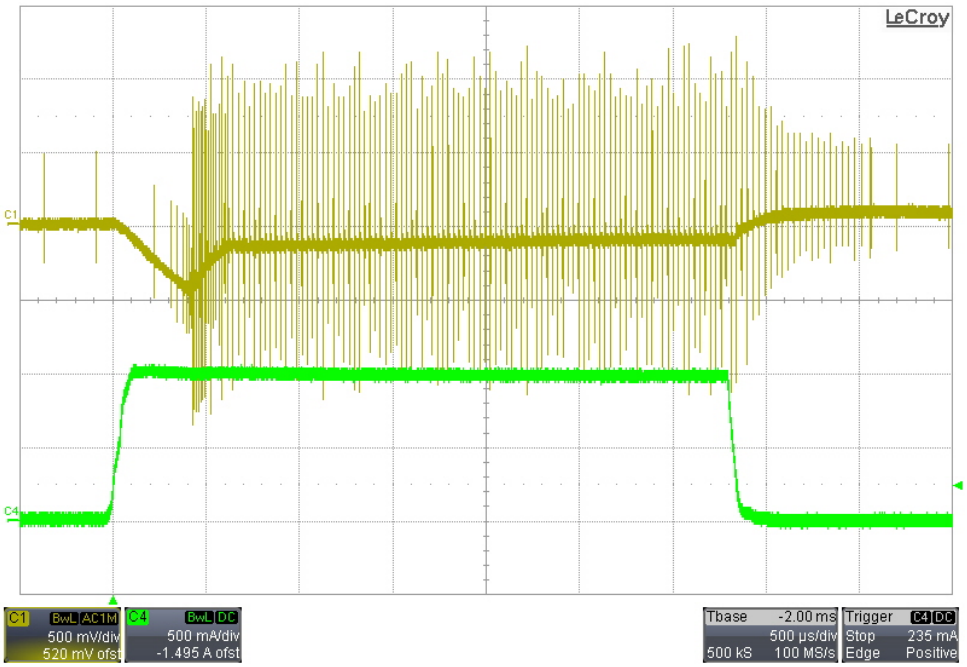

## 8.2 0A to 1A Transient – 230VAC/50Hz Input



### 8.3 10mA to 1A Transient – 115VAC/60Hz Input




### 8.4 10mA to 1A Transient – 230VAC/50Hz Input

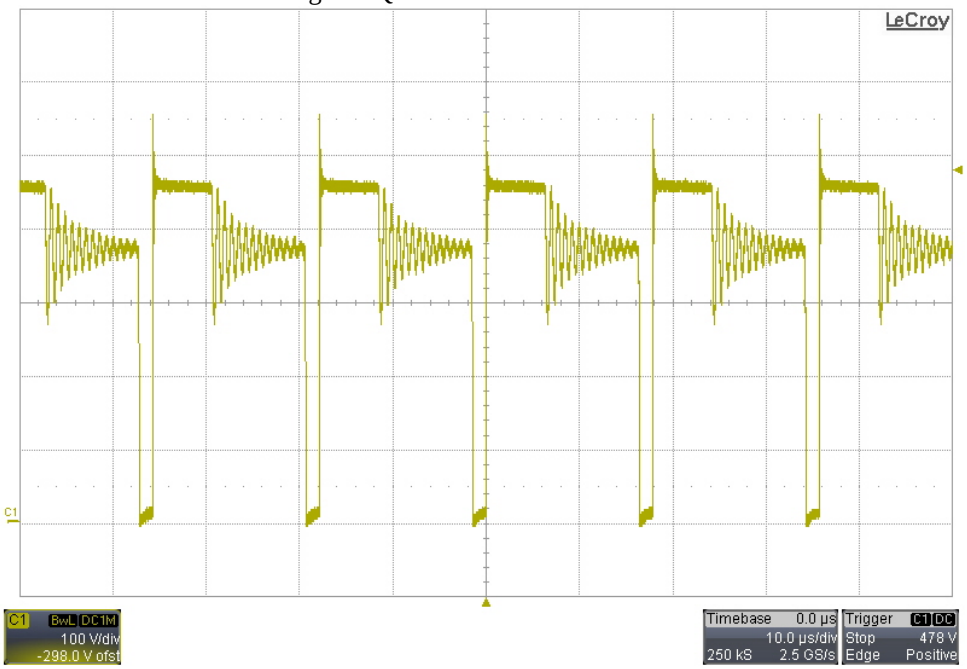


# 9 Switching Waveforms

The images below show the voltage waveforms on the switching devices within the supply. The input was 265VAC/50Hz. The output was loaded 1.7A.

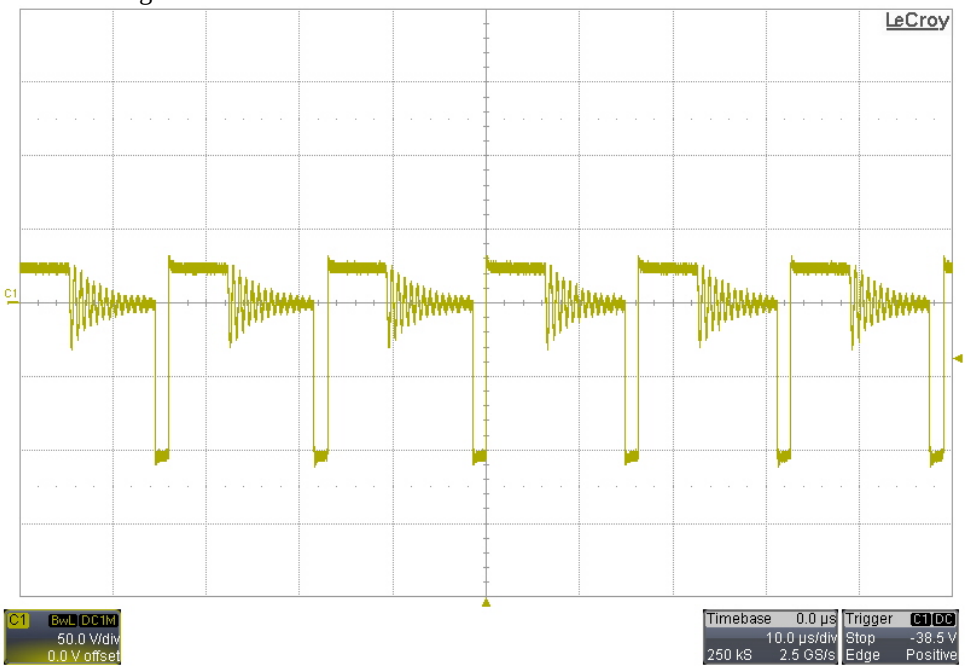
## 9.1 Primary Waveforms

The image below shows the drain-to-source voltage on Q1.

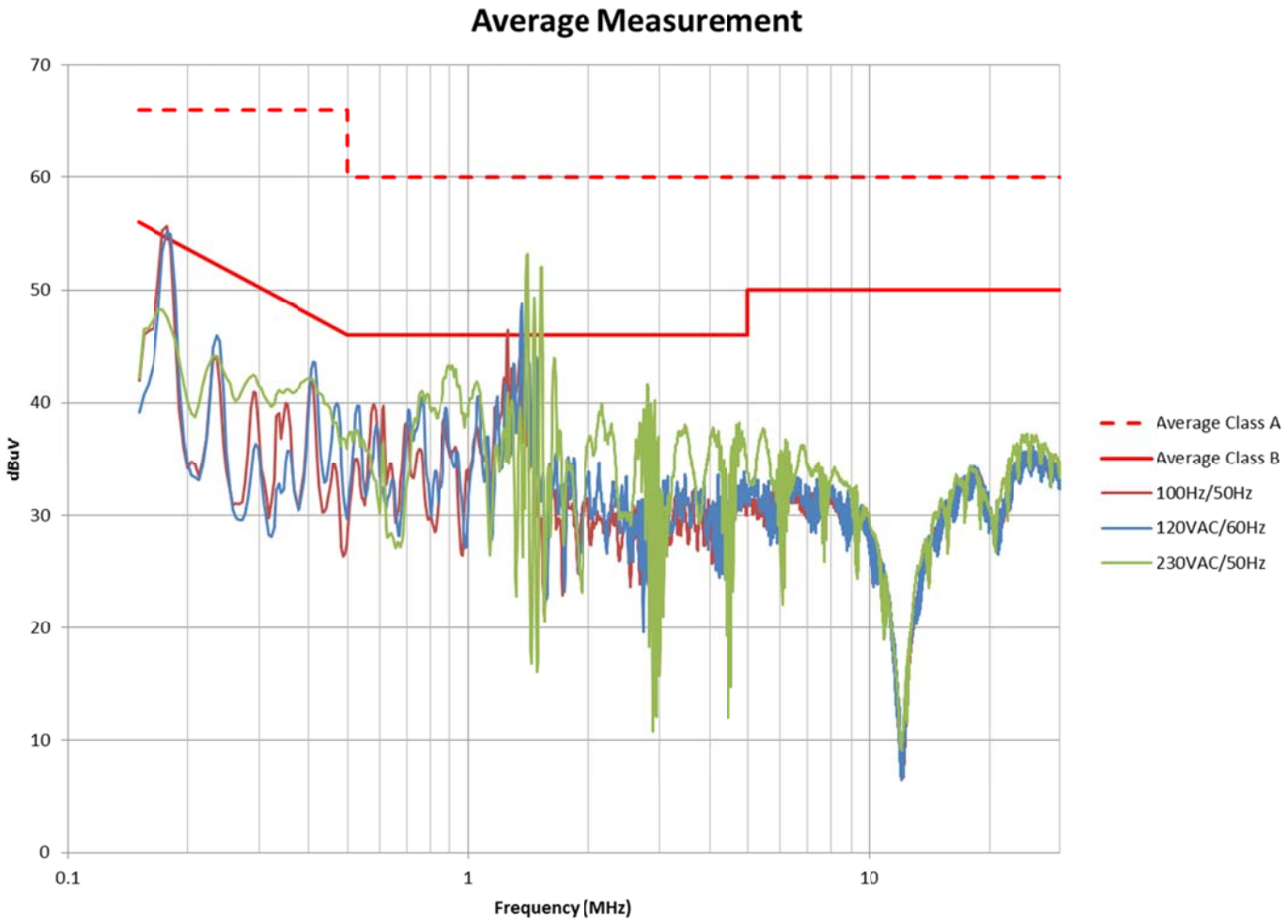



## 9.2 Secondary Waveforms

The image below shows the voltage on the anode of D3.



## 10 Conducted Emissions



# IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale (https:www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265