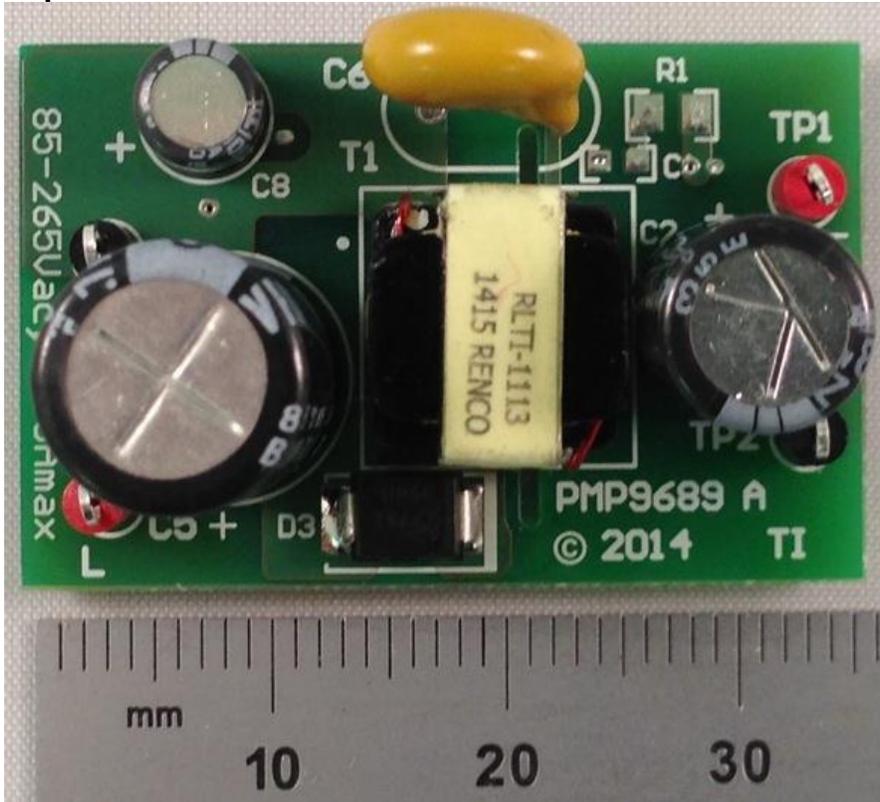


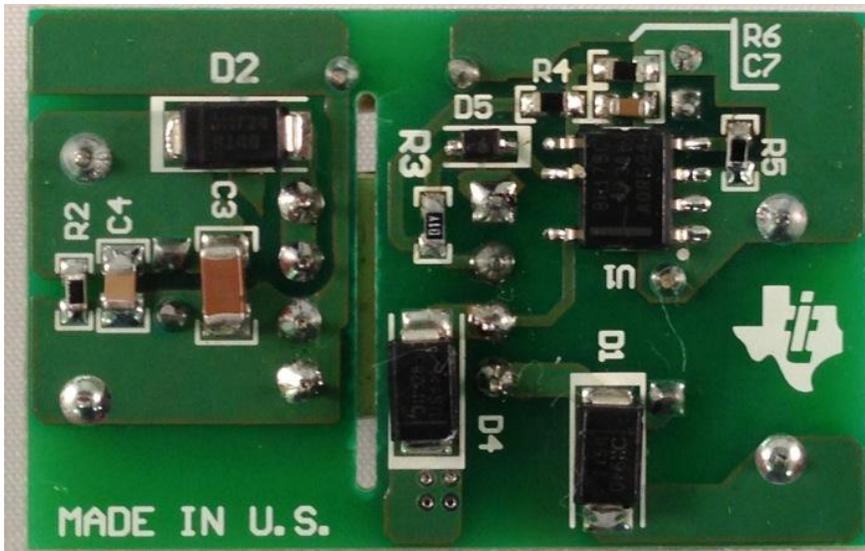
1 Photo

The photographs below show the PMP9689 Rev A assembly. This circuit was built on a PMP9689 Rev A PCB.

Top side

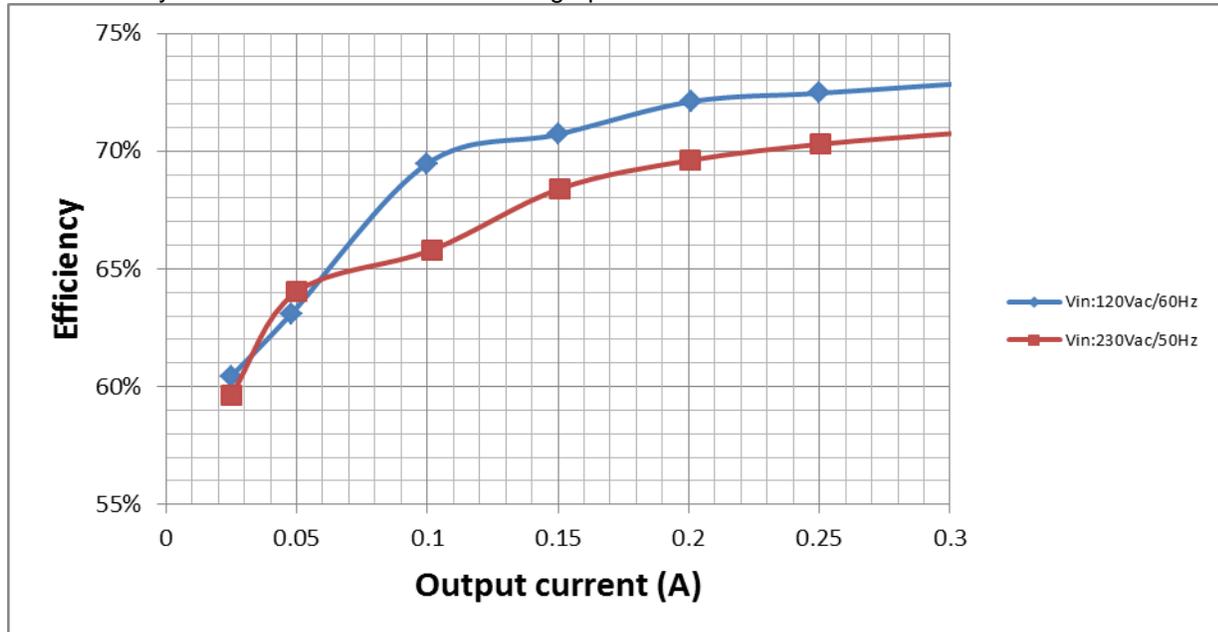


Bottom side



2 Converter Efficiency

The efficiency data is shown in the tables and graph below.



V_{in}=120V_{AC}/60Hz

V _{in} (V)	I _{in} (mA)	P _{in} (W)	V _{out} (V)	I _{out} (A)	P _{out} (W)	Losses(W)	Efficiency (%)
120.07	45.68	2.111	5.06	0.304	1.53824	0.57276	72.87%
120.08	38.97	1.744	5.055	0.25	1.26375	0.48025	72.46%
120.09	32.76	1.408	5.051	0.201	1.015251	0.392749	72.11%
120.09	26.32	1.071	5.049	0.15	0.75735	0.31365	70.71%
120.1	19.542	0.7273	5.053	0.1	0.5053	0.222	69.48%
120.11	11.872	0.3852	5.064	0.048	0.243072	0.142128	63.10%
120.12	7.38	0.2097	5.07	0.025	0.12675	0.08295	60.44%
120.12	1.205	0.03	5.081	0	0	0.03	0.00%

V_{in}=230V_{AC}/50Hz

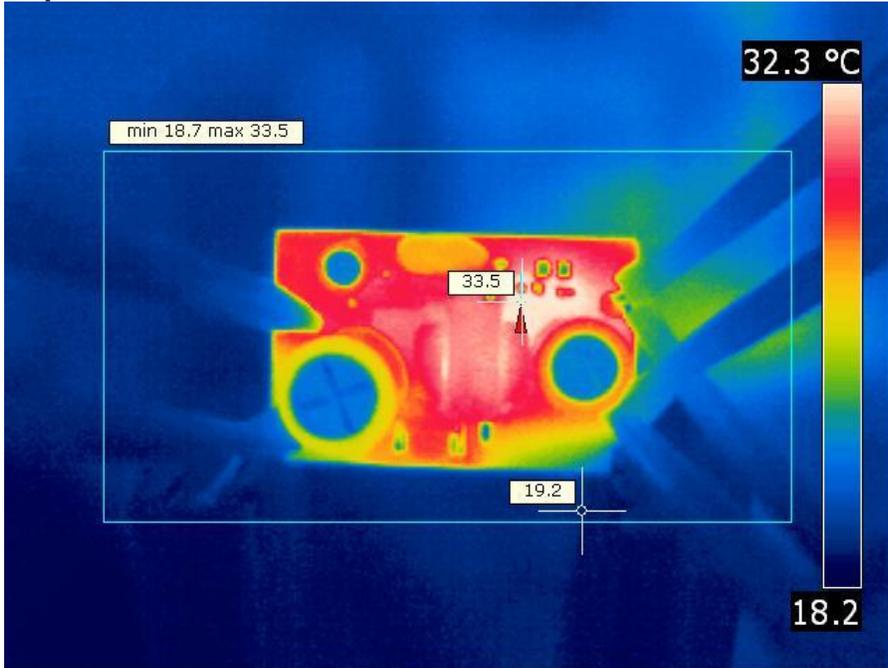
V _{in} (V)	I _{in} (mA)	P _{in} (W)	V _{out} (V)	I _{out} (A)	P _{out} (W)	Losses(W)	Efficiency (%)
230	30.25	2.142	5.043	0.3005	1.515422	0.6265785	70.75%
230.1	26.4	1.797	5.041	0.2506	1.263275	0.5337254	70.30%
230.1	22.38	1.452	5.039	0.2006	1.010823	0.4411766	69.62%
230.1	18.208	1.111	5.04	0.1508	0.760032	0.350968	68.41%
230.1	13.893	0.7794	5.043	0.1017	0.512873	0.2665269	65.80%
230.1	8.09	0.3931	5.053	0.0498	0.251639	0.1414606	64.01%
230.1	4.703	0.2109	5.058	0.02486	0.125742	0.08515812	59.62%
230.1	0.7492	0.025	5.064	0	0	0.025	0.00%

3 Thermal Images

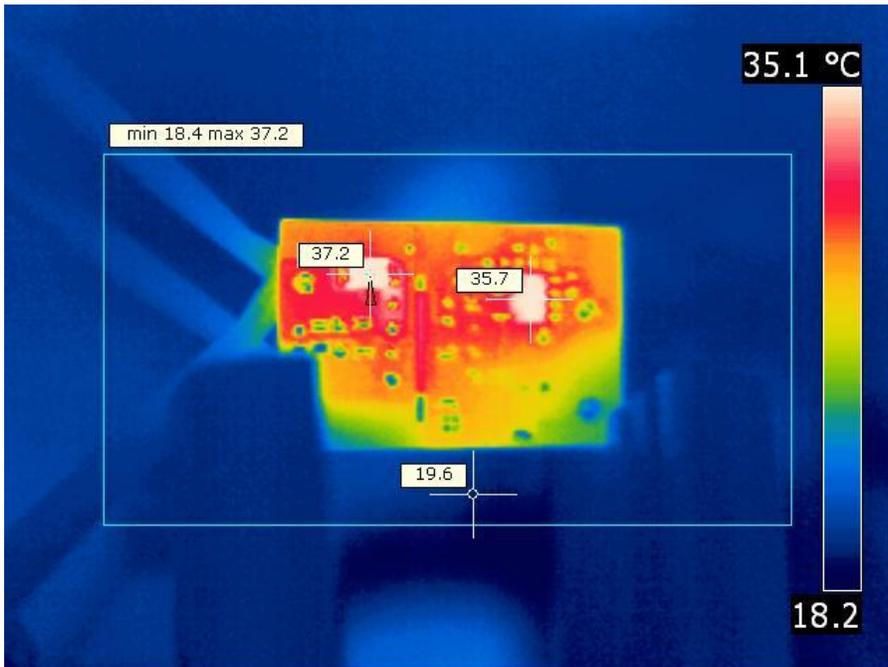
The thermal images below show a top view and bottom view of the board. The ambient temperature was 20°C with no forced air flow. The output was at full load: 5V/0.3A.

V_{in}=120V_{AC}/60Hz

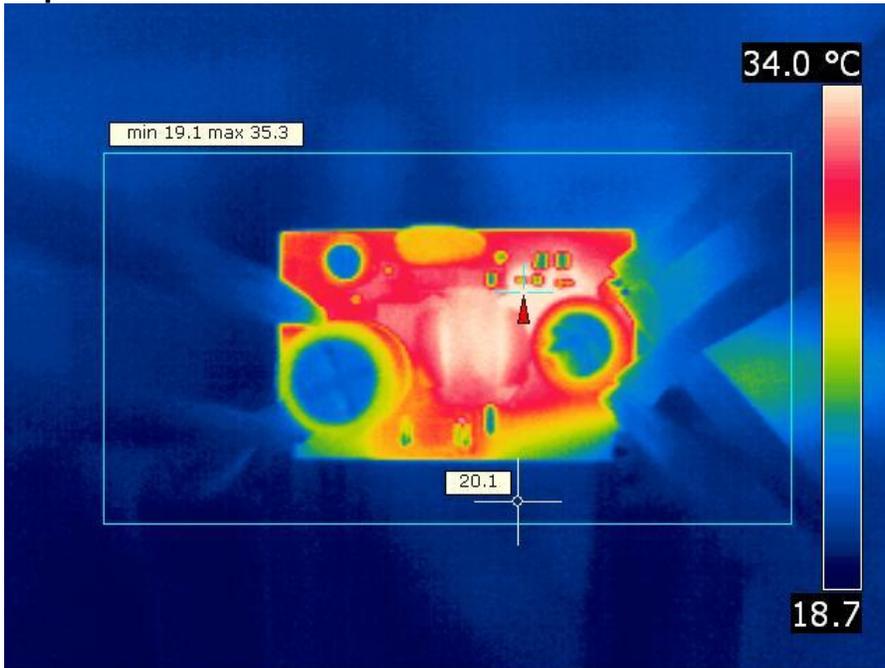
Top Side



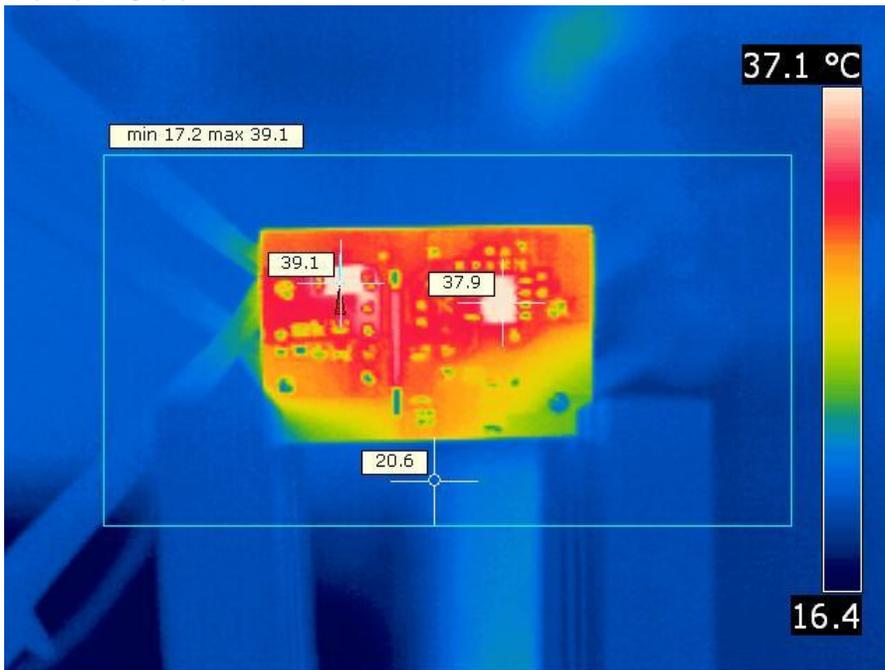
Bottom Side



$V_{in}=230V_{AC}/50Hz$
Top Side



Bottom Side



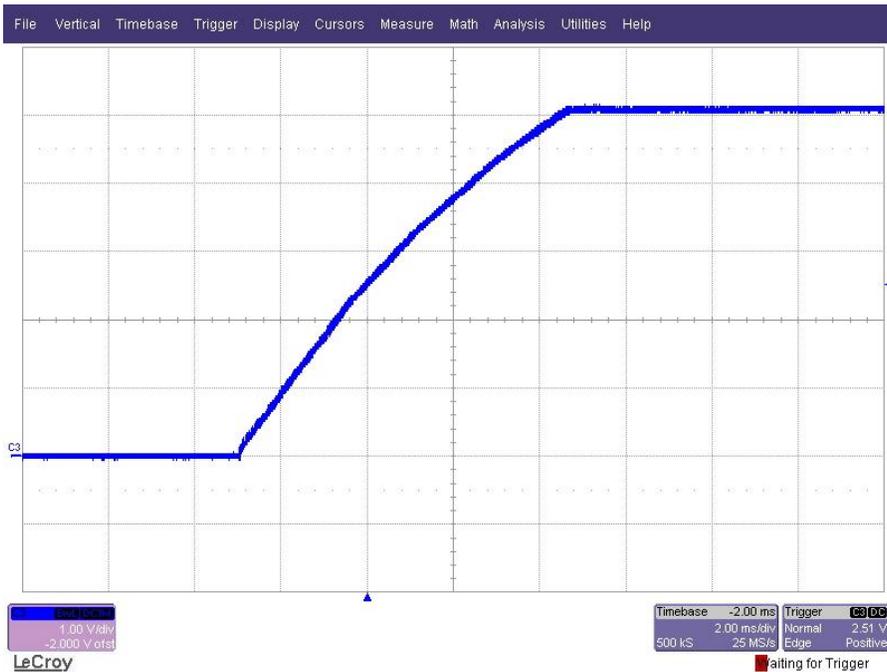
4 Startup

The output voltages at startup are shown in the images below with single phase input voltage.

4.1 Start Up @ 85V_{ac}/60Hz: 5V/0.3A.



4.2 Start Up @ 85V_{ac}/60Hz: no load.



4.3 Start Up @ 230V_{ac}/50Hz: 5V/0.3A.



4.4 Start Up @ 230V_{ac}/50Hz: no load.



5 Turn off

The output voltage at turn off transient is shown in the image below at full load (5V/0.3A) and a 85V_{ac}/60Hz input.



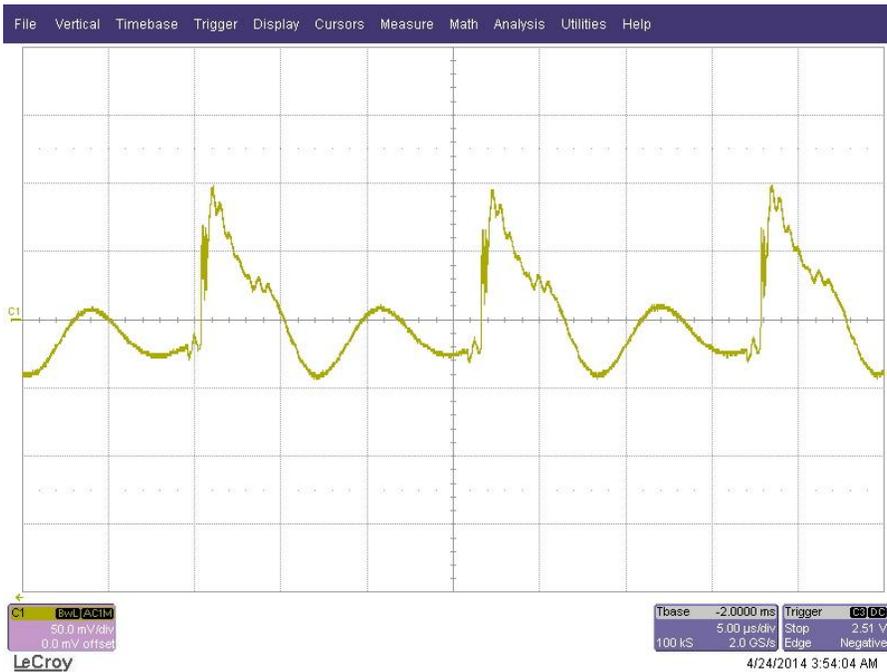
6 Output Ripple Voltages

The output ripple voltages are shown in the plots below.

6.1 120V/60Hz – 5V/0.3A



6.2 230V/50Hz – 5V/0.3A



6.3 120V/60Hz – 5V/0A



6.4 230V/50Hz – 5V/0A



7 Load Transient

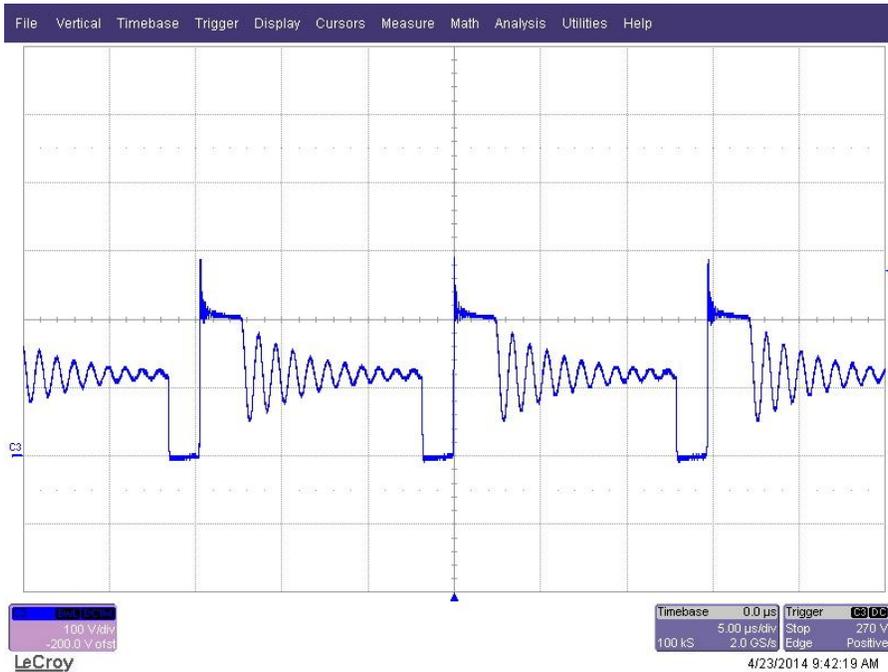
The image below shows $5V_{out}$ voltage response to a **0.1A** to **0.3A** load transient at a $120V_{ac}/60Hz$ input.



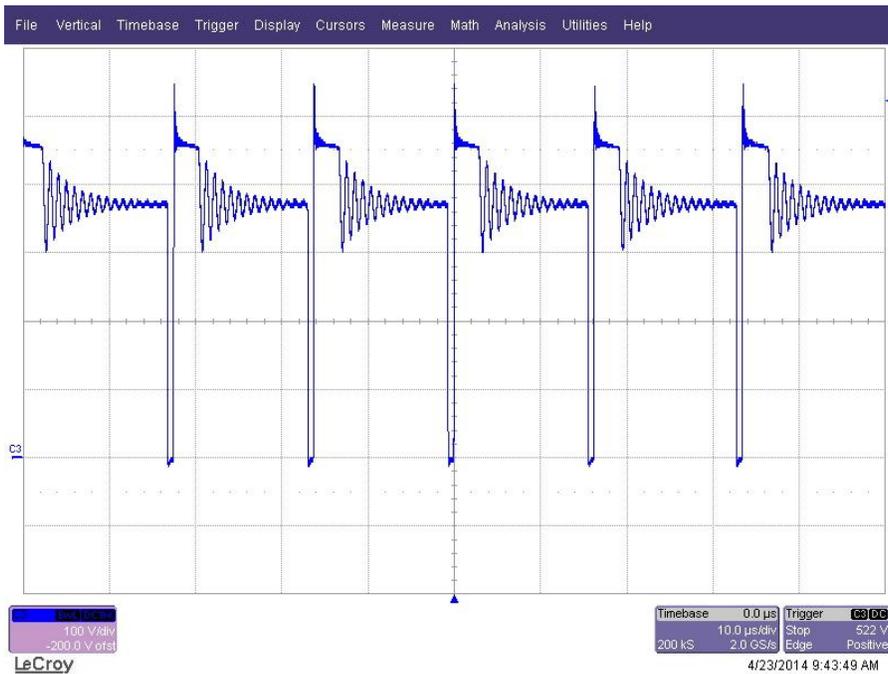
8 Switching Waveforms

The images below show key switching waveforms of PMP9689RevA. The waveforms are measured with 0.3A full load.

8.1 Primary MOSFET U1 pin8 @ 85V_{ac}/60Hz



8.2 Primary MOSFET U1 pin8 @ 265V_{ac}/50Hz



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](https://www.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
Copyright © 2021, Texas Instruments Incorporated