

1 TPS92314 DIM Experimental Results (230VAC)

2 Specifications

- Input Power \approx 8W
- Output Power \approx 7W
- Line Voltage = 200~240VAC
- Line Frequency = 50Hz
- LED Forward Voltage = 20V
- LED Current \approx 350mA
- Efficiency > 80% @230VAC
- Power Factor \geq 0.9
- Topology: Single-stage buck-boost
- Solution size: 56mm (L) x 22mm (W) x 14mm (H)

3 Test Equipment

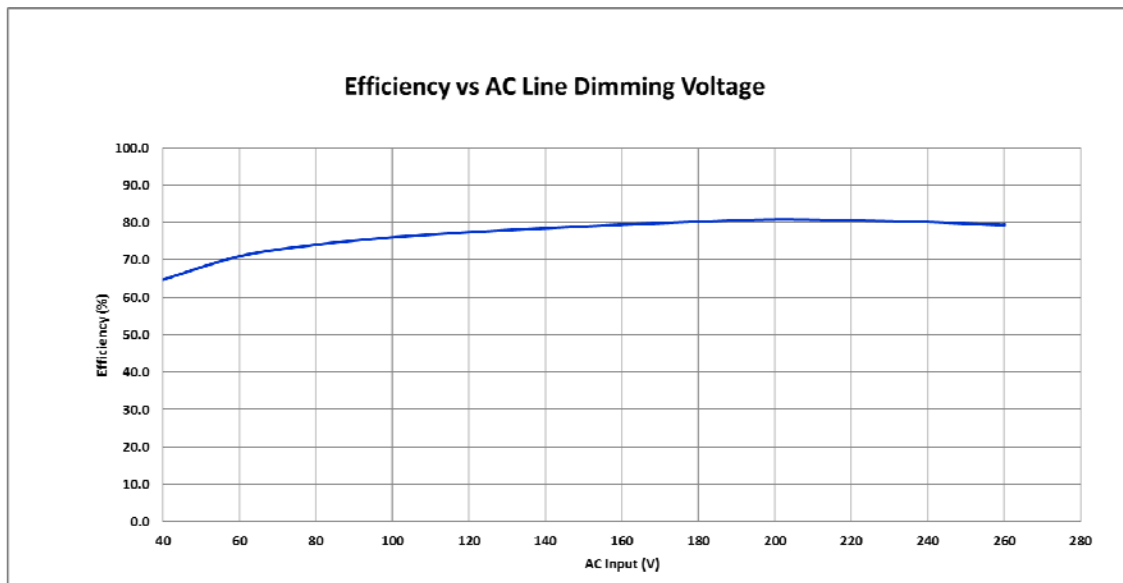
- Voltage Source: 190 V_{RMS} to 265 V_{RMS} isolated AC source PCR500LA (KIKUSUI)
- Multi meters: Agilent 34401A
- Power Meter: YOKOGAWA WT210
- Output Load: 7 LEDs in series (VF = 3 V at 350mA per LED)
- Oscilloscope: TDS3045C (TEKTRONIX)
- Operating Temperature: 25°C
- Recommended Wire Gauge: 18 AWG not more than two feet long

4 Performance Data and Typical Characteristic Curves.

Preset Voltage (V)	40	60	80	100	120	140	160	160	180	200	220	240	260
Frequency (Hz)	50	50	50	50	50	50	50	50	50	50	50	50	50
Input Voltage (V)	40.0	60.0	80.0	100.0	120.0	140.0	160.1	160.1	180.0	200.1	220.1	240.1	260.2
Input Current (A)	0.021	0.029	0.034	0.037	0.040	0.041	0.043	0.043	0.045	0.046	0.043	0.040	0.038
Input Power (W)	0.82	1.72	2.68	3.66	4.66	5.68	6.70	6.72	7.75	8.79	8.91	9.02	9.13
Power Factor	0.961	0.983	0.986	0.986	0.983	0.979	0.973	0.974	0.967	0.960	0.947	0.932	0.915
Output Voltage (V)	18.38	18.74	19.02	19.25	19.46	19.64	19.81	19.84	20.00	20.15	20.15	20.18	20.11
Output Current (A)	0.029	0.065	0.104	0.145	0.185	0.227	0.269	0.269	0.311	0.353	0.356	0.358	0.360
Output Power (W)	0.53	1.22	1.99	2.78	3.61	4.46	5.32	5.34	6.22	7.11	7.18	7.23	7.24
Efficiency (%)	64.7	71.0	74.1	76.1	77.4	78.5	79.4	79.4	80.2	80.8	80.6	80.1	79.3

4.1.1 Table 1 Test Data from 60VAC to 260VAC/50Hz

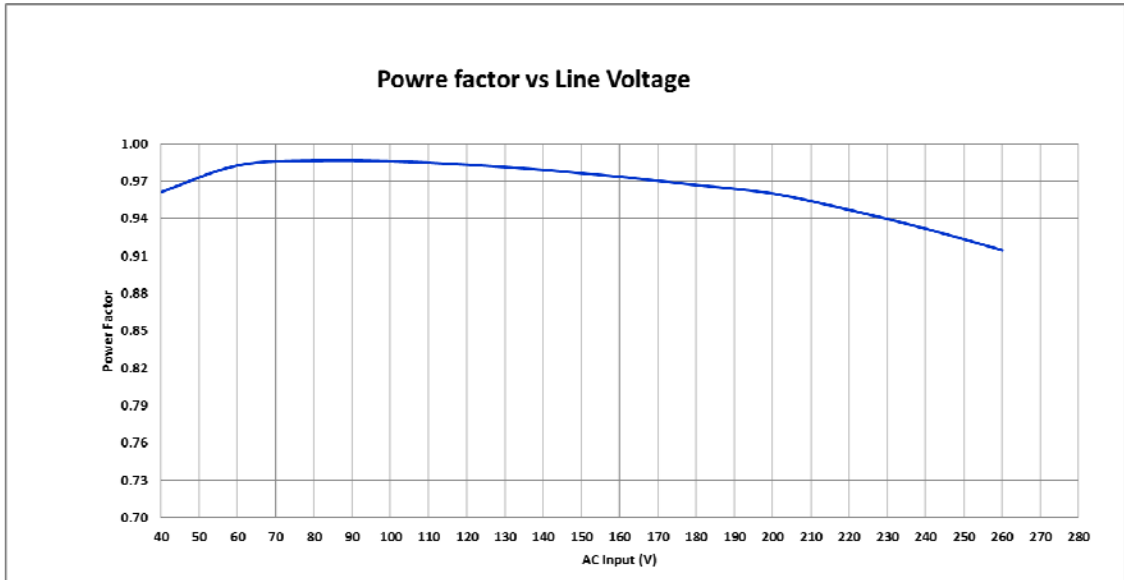
1. Efficiency



4.2

4.2.1 Figure 2 Efficiency vs. Line Voltage from 40VAC to 260VAC/50Hz

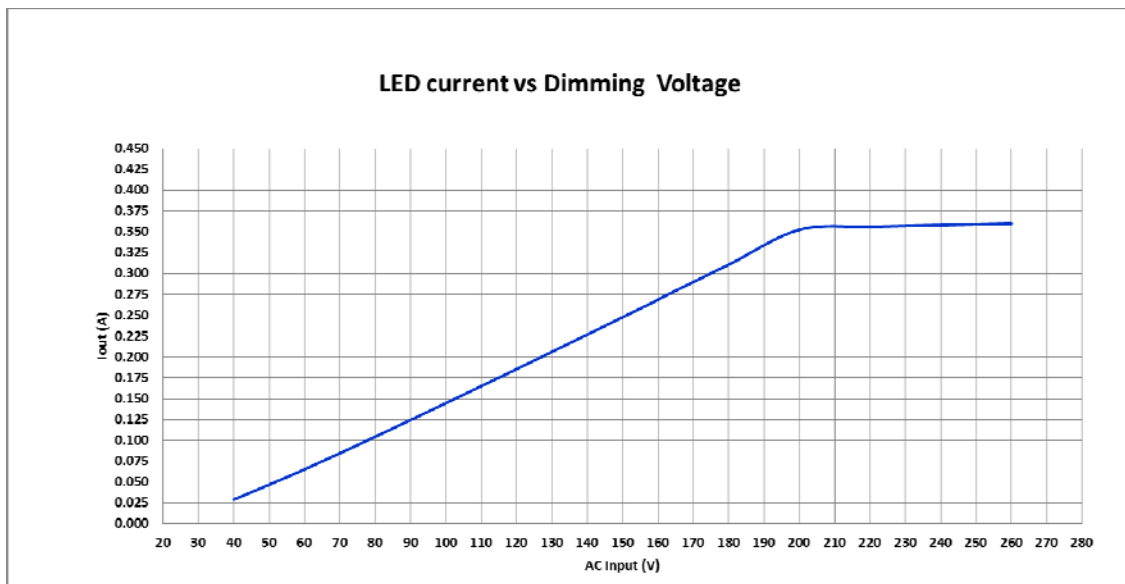
2. Power Factor



4.3

4.3.1 Figure 3 Power Factor vs. Line Voltage from 40VAC to 260VAC/50Hz

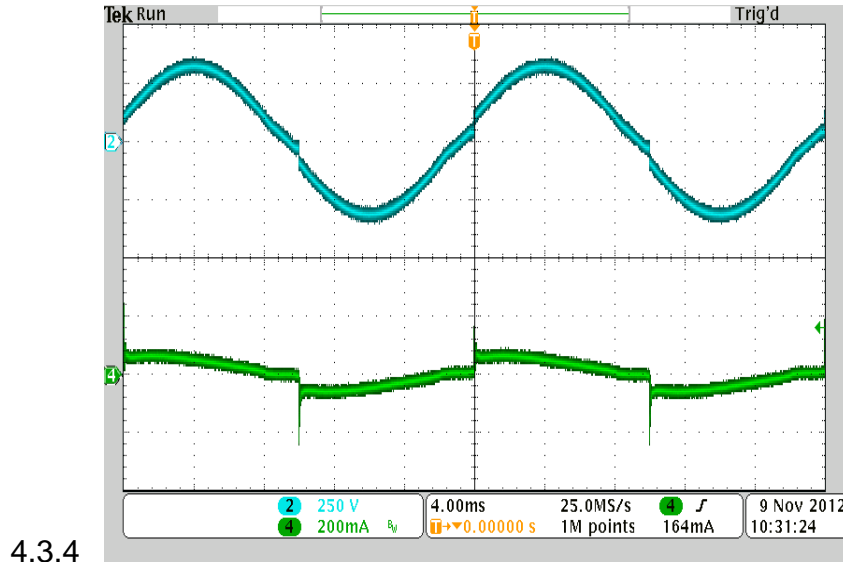
3. LED Current vs Line Voltage



4.3.2

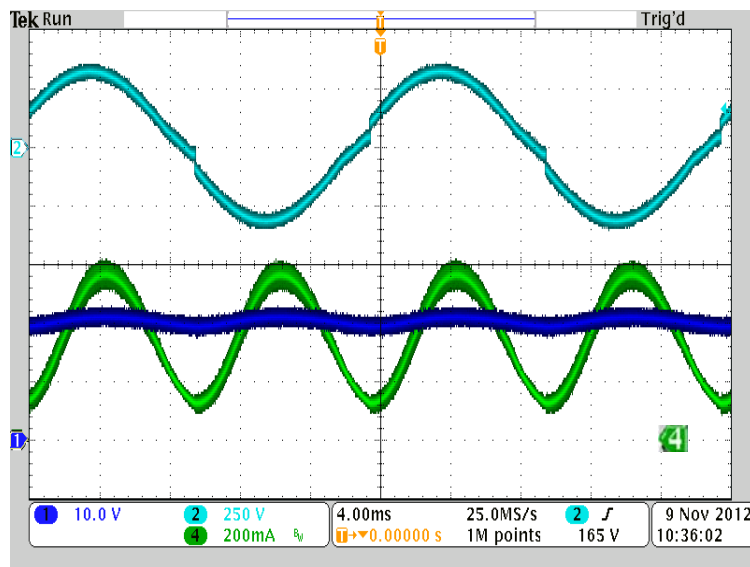
4.3.3 Figure 4 ILED vs. AC Line Dimming Voltage from 40 to 260VAC/50Hz.

1. Input and Line Voltage Waveforms vs. Dimmer Setting



4.3.5 Figure 5 Dimmer Full ON

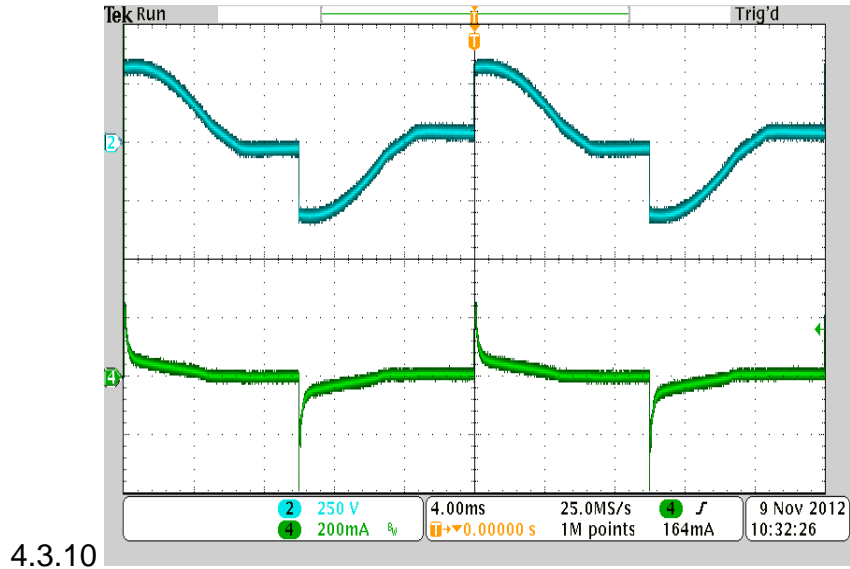
4.3.6 CH2- Input Voltage; CH4- Input current



4.3.7 Figure 6 Dimmer FULL ON

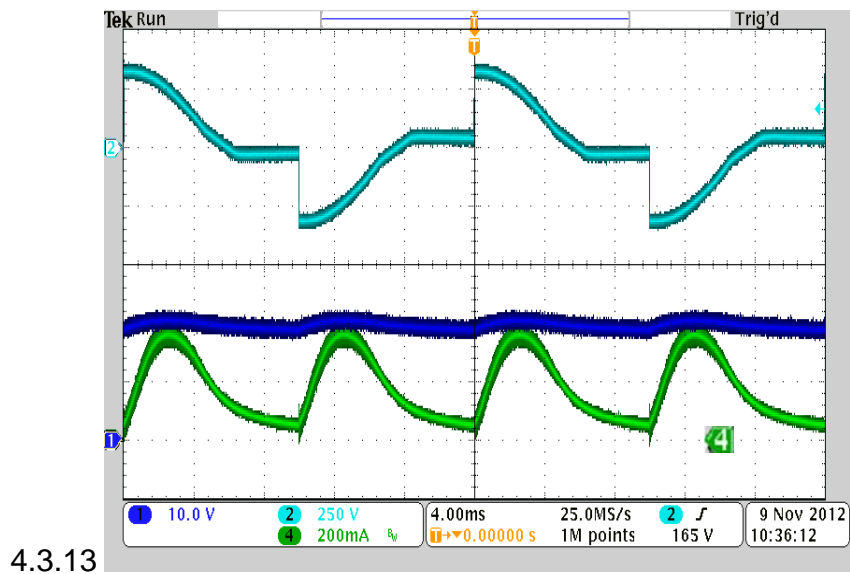
4.3.8 CH1- Output Voltage; CH2- Input Voltage; CH4- Output current

4.3.9 Input and Line Voltage Waveforms vs. Dimmer Setting



4.3.11 Figure 7 Dimmer 50% ON

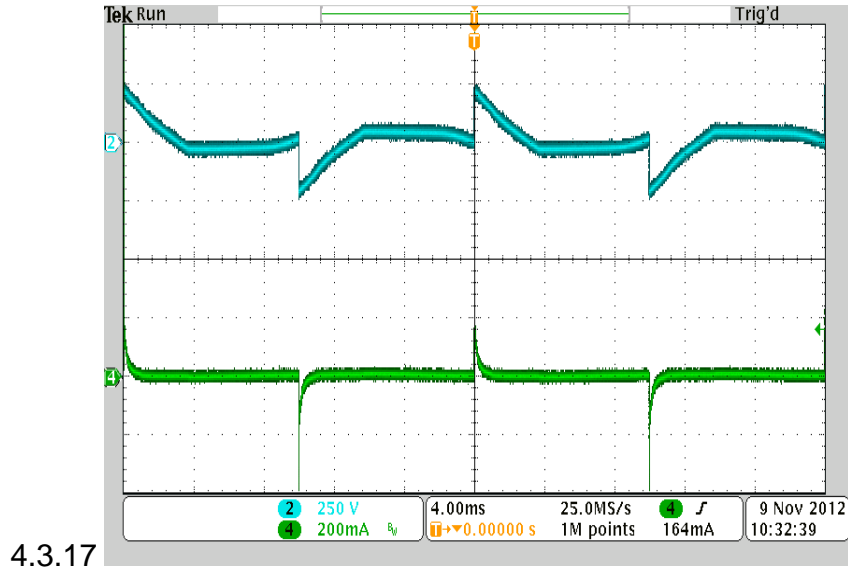
4.3.12 CH2- Input Voltage; CH4- Input Current



4.3.14 Figure 8 Dimmer 50% ON

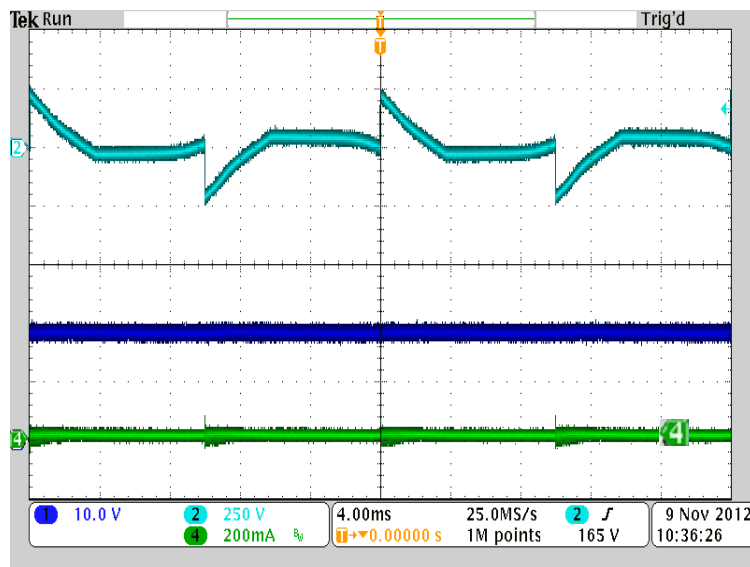
4.3.15 CH1- Output Voltage; CH2- Input Voltage; CH4- Output Current

4.3.16 Input and Line Voltage Waveforms vs. Dimmer Setting



4.3.18 Figure 9 Dimmer minimum ON

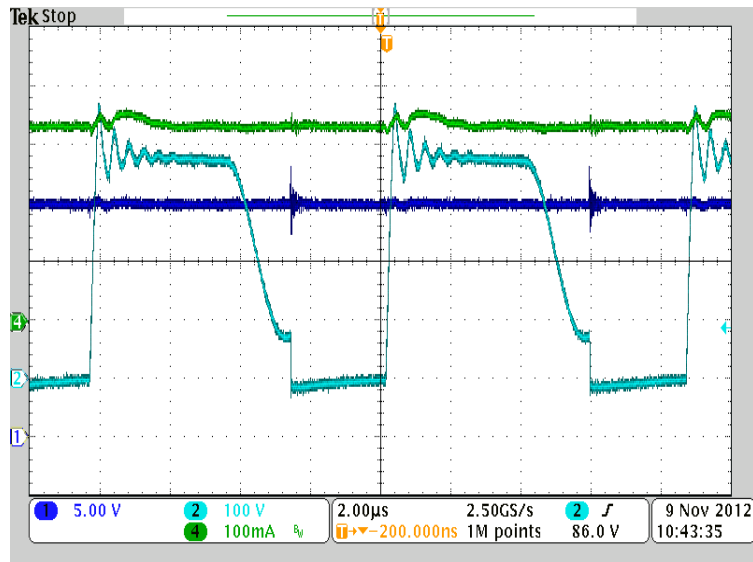
4.3.19 CH2- Input Voltage; CH4- Input Current



4.3.20 Figure 10 Dimmer Minimum ON

4.3.21 CH1- Output Voltage; CH2 - Input Voltage; CH4 - Output Current

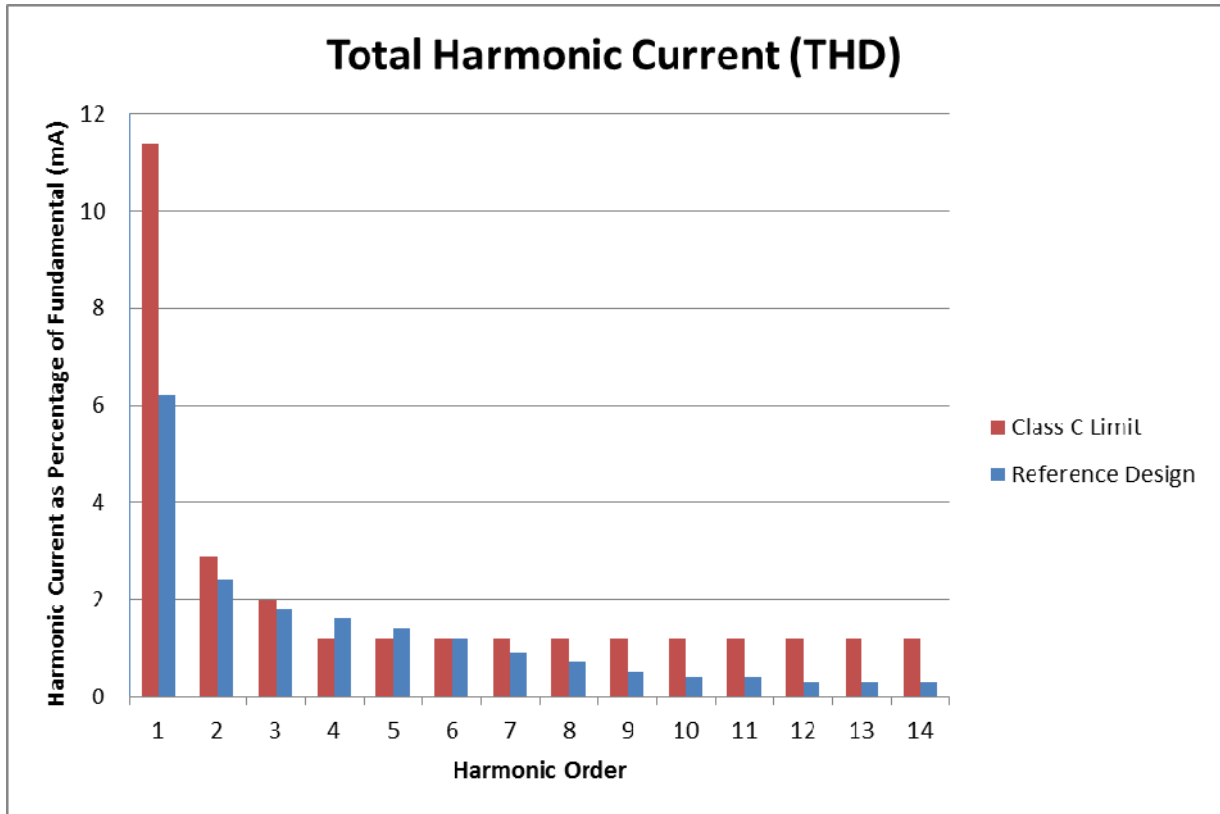
2. Switch Node Voltage Valley Switching



4.3.22 Figure 11 Switch Node and Output Current Waveform

4.3.23 CH1 – Output Voltage; CH2 – Switch Node LX; CH4 – Output Current

4.3.24 Total Harmonic Distortion



4.3.25 Figure 12 Current Harmonic Performance vs. EN/IEC61000-3-2 Class C Limits at 230VAC/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