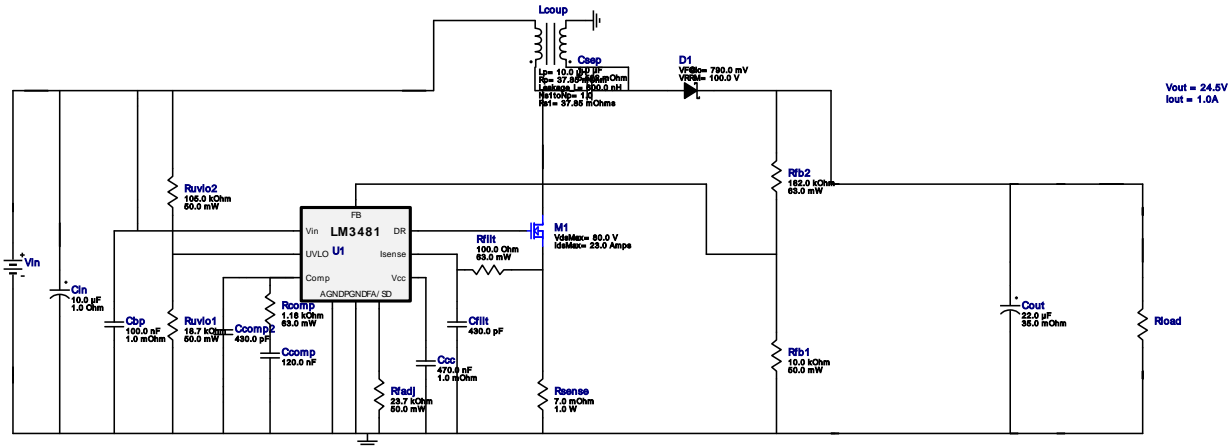
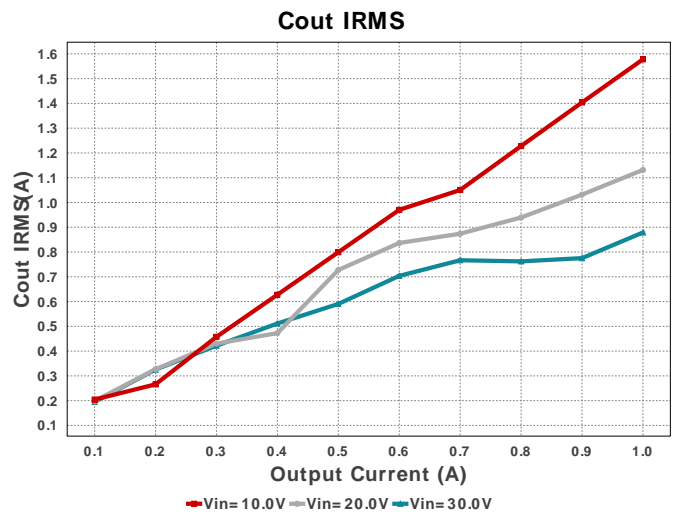
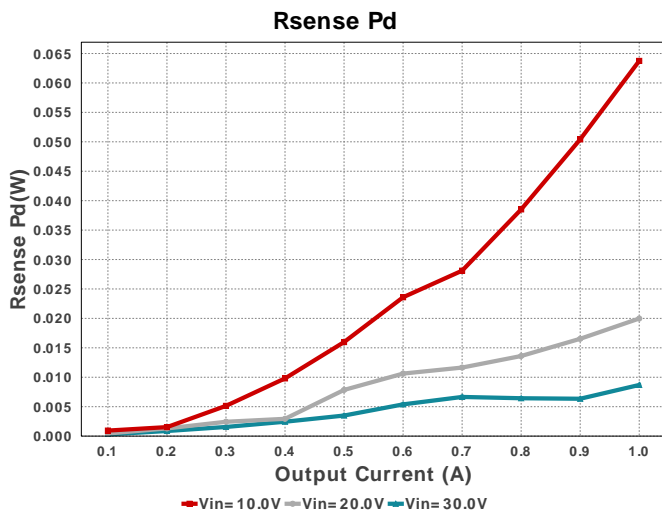


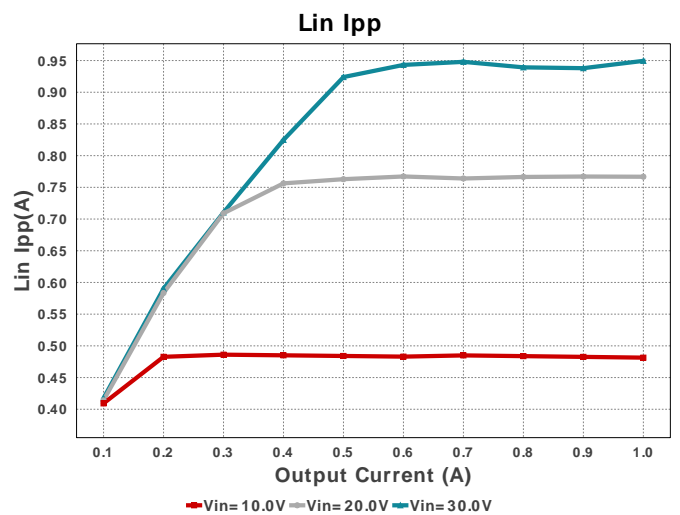
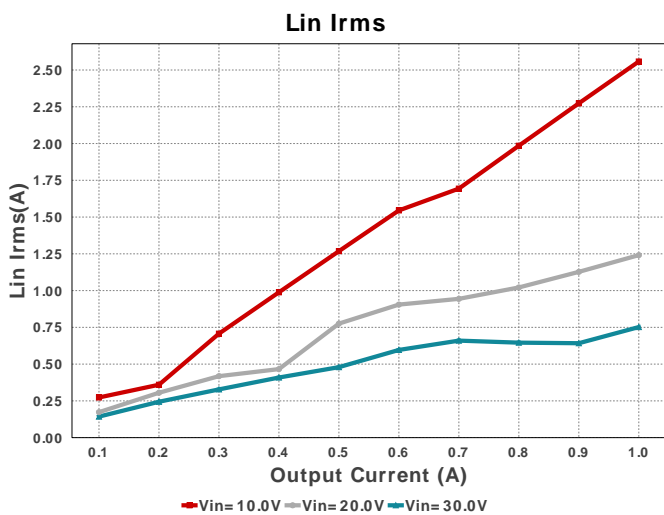
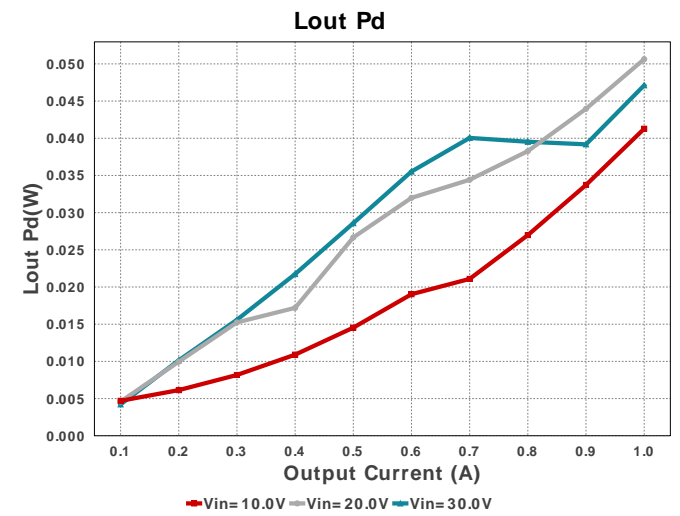
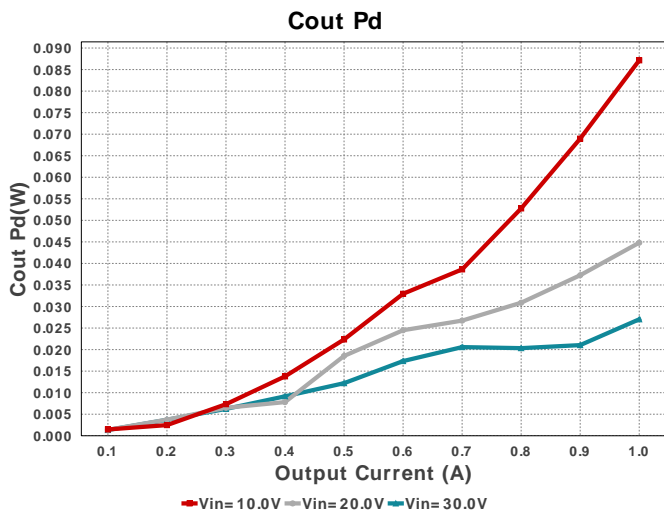
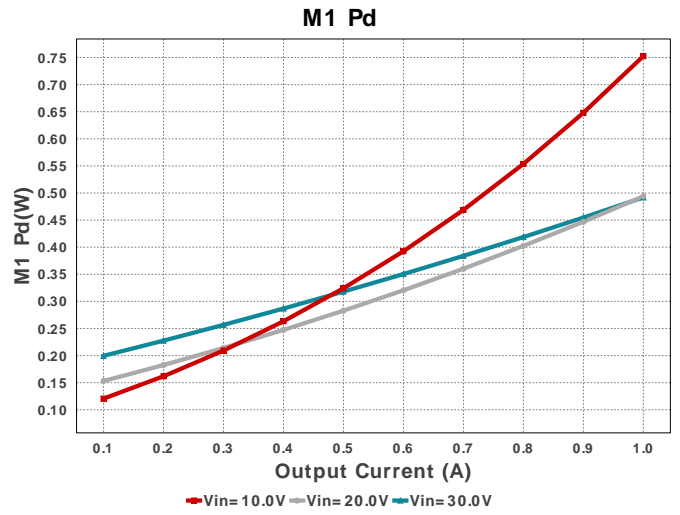
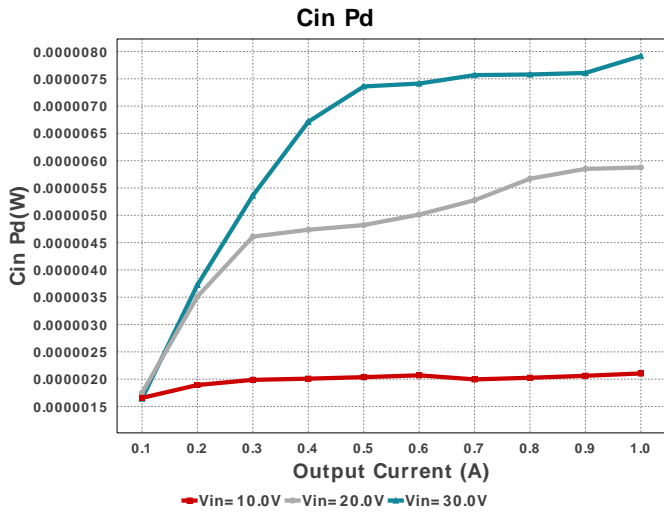
WEBENCH® Design Report

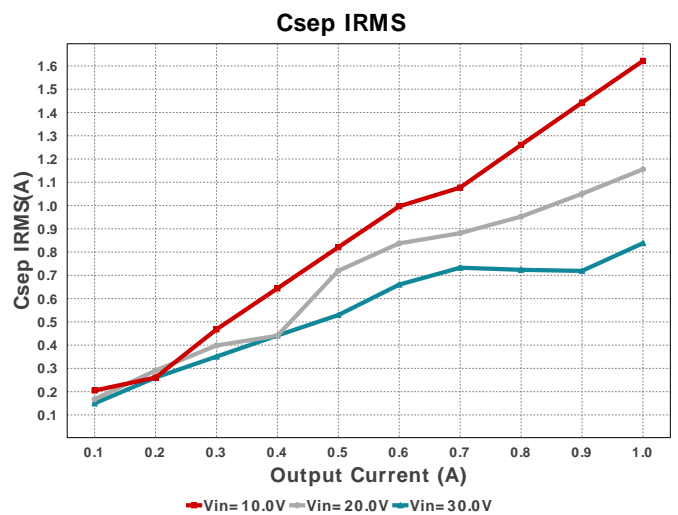
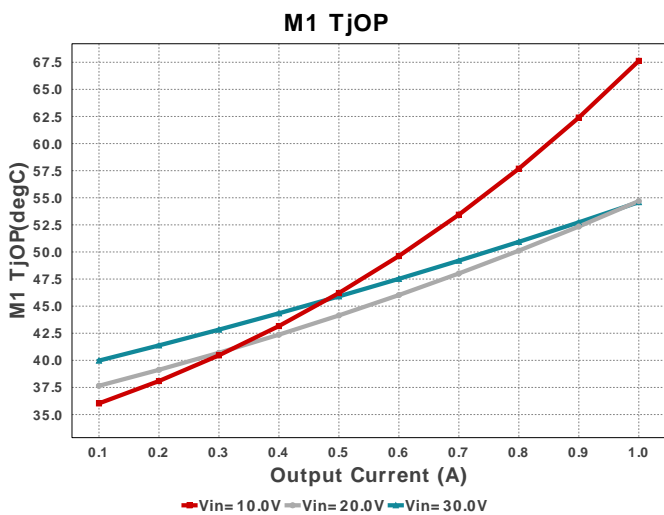
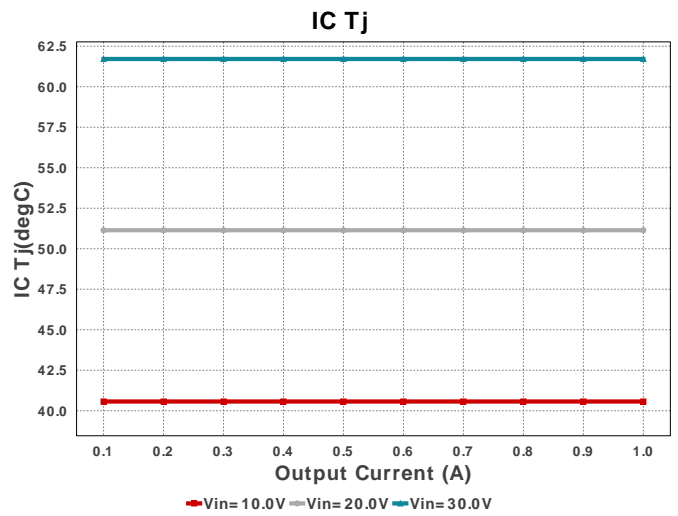
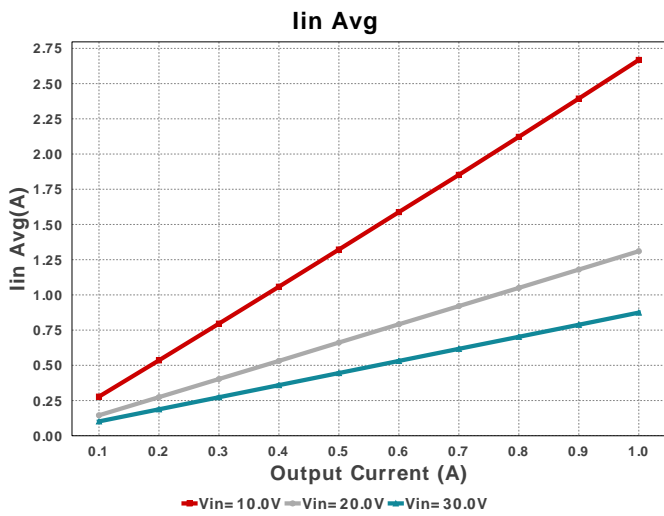
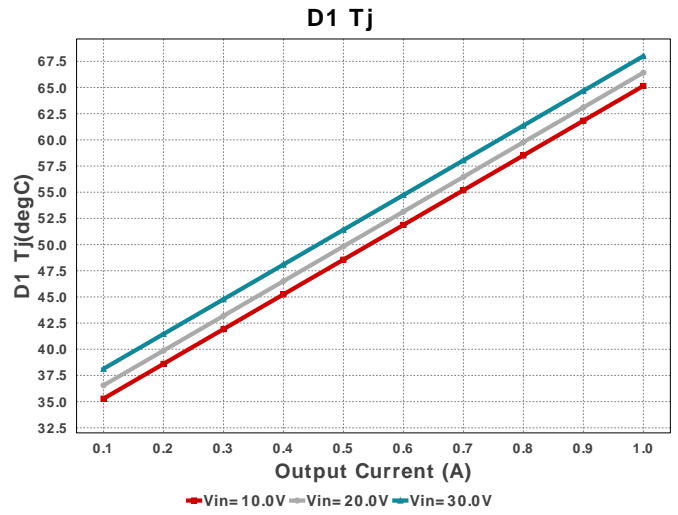
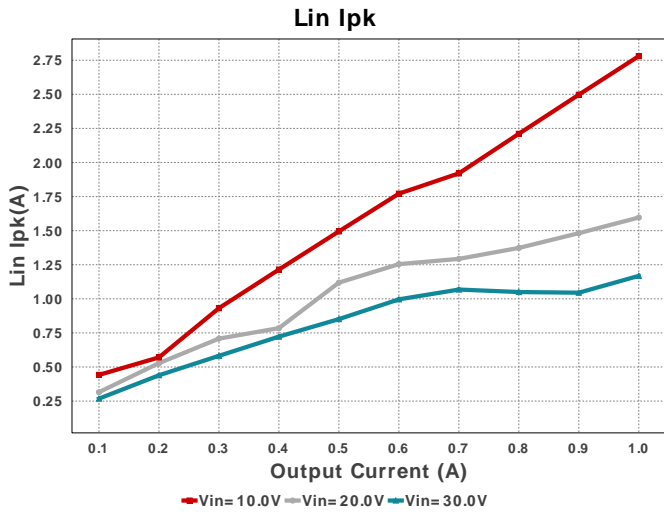
 Design : 86 LM3481MM/NOPB
 LM3481MM/NOPB 10V-30V to 24.50V @ 1A

Electrical BOM

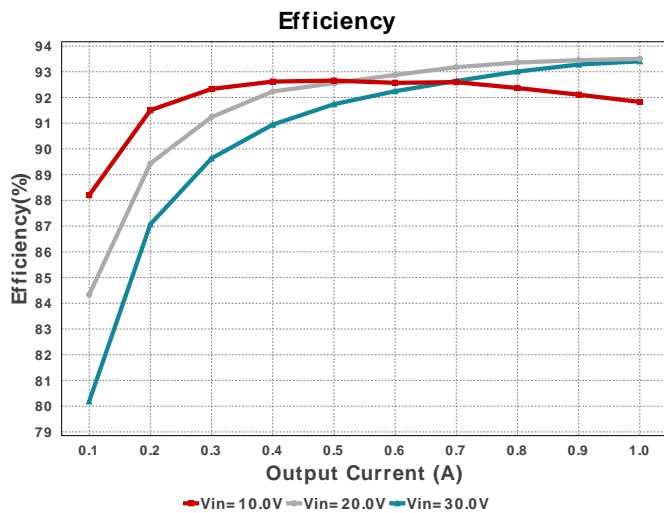
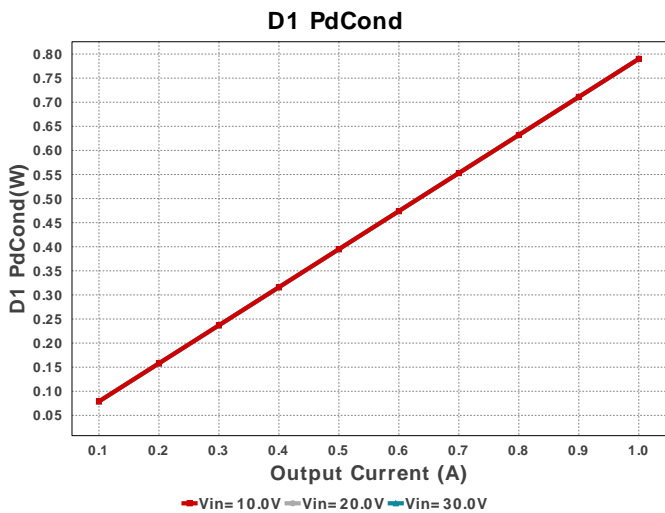
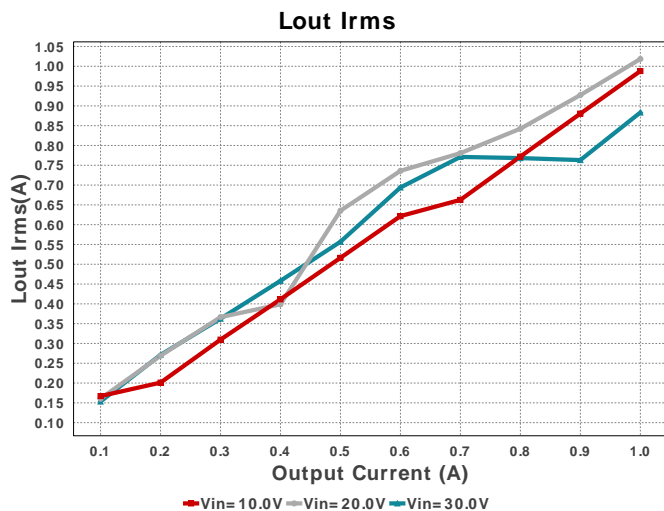
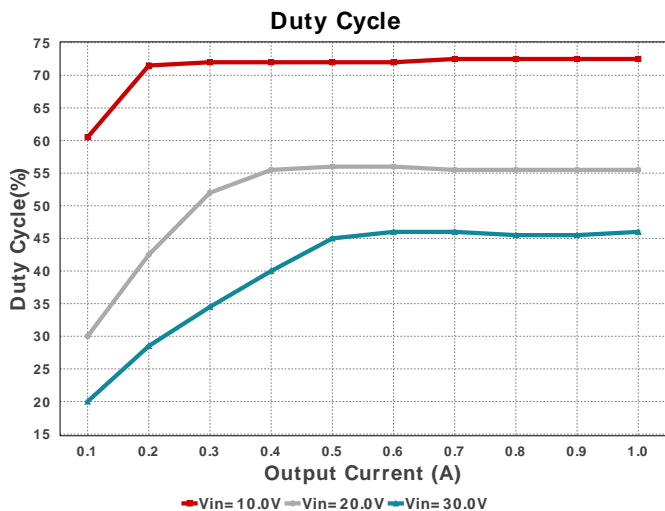
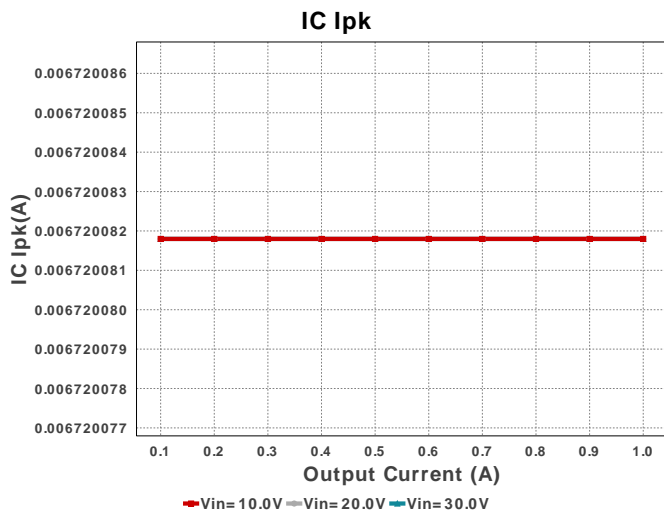
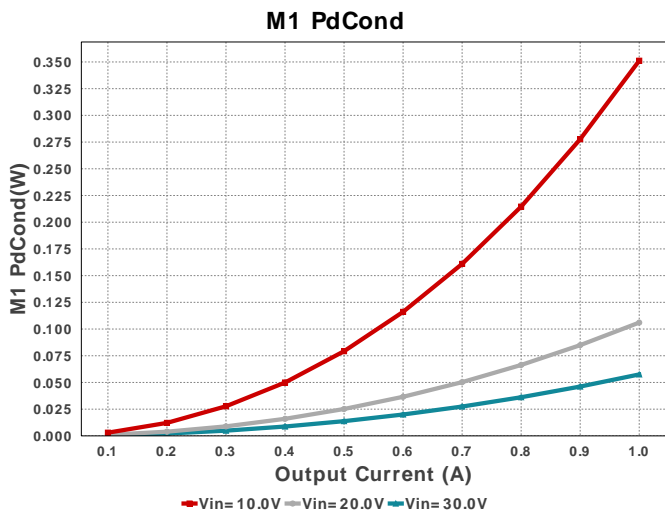
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Cbp	Yageo	CC0805KRX7R9BB104 Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
Ccc	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.02	 0402 3 mm ²
Ccomp	Samsung Electro-Mechanics	CL31C124JOHNNNE Series= C0G/NP0	Cap= 120.0 nF VDC= 5.0 V IRMS= 0.0 A	1	\$1.06	 1206 11 mm ²
Ccomp2	MuRata	GRM1555C1H431GA01D Series= C0G/NP0	Cap= 430.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	 0402 3 mm ²
Cfilt	MuRata	GRM1555C1H431GA01D Series= C0G/NP0	Cap= 430.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	 0402 3 mm ²
Cin	Vishay-Sprague	293D106X9063E2TE3 Series= 293D	Cap= 10.0 uF ESR= 1.0 Ohm VDC= 63.0 V IRMS= 580.0 mA	1	\$3.42	 3216-18 11 mm ²
Cout	Panasonic	35SVPF22M Series= SVPF	Cap= 22.0 uF ESR= 35.0 mOhm VDC= 35.0 V IRMS= 2.6 A	1	\$0.44	 CAPSMT_62_F61 74 mm ²
Csep	TDK	C1608X5R1H105K080AB Series= X5R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 50.0 V IRMS= 2.2162 A	1	\$0.04	 0603 5 mm ²
D1	Diodes Inc.	B3100-13-F	VF@Io= 790.0 mV VRRM= 100.0 V	1	\$0.22	 SMC 83 mm ²

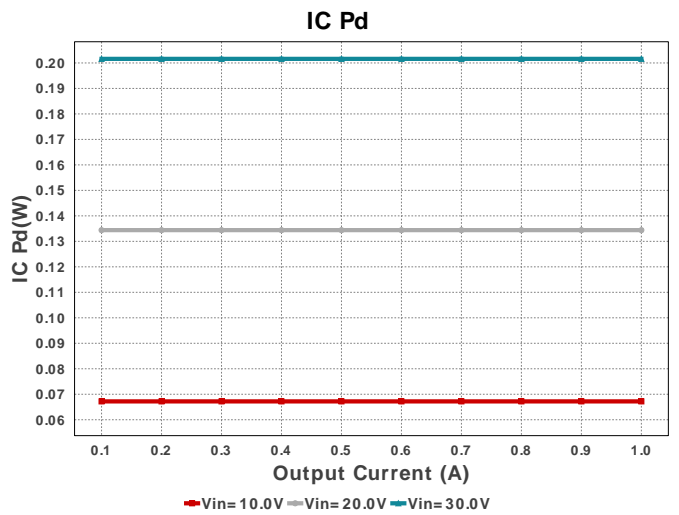
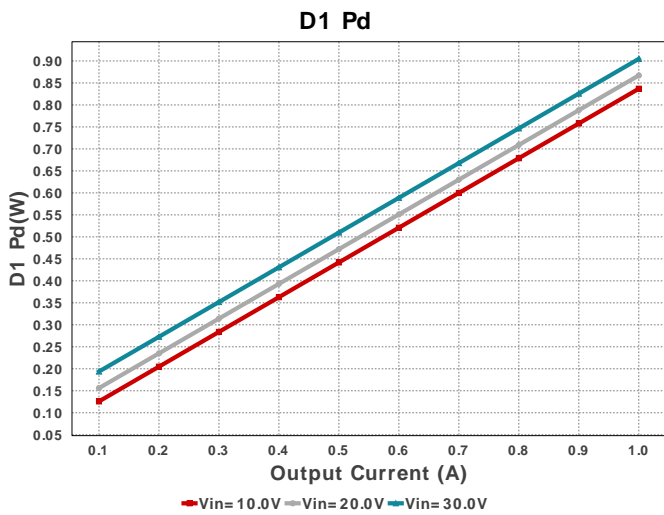
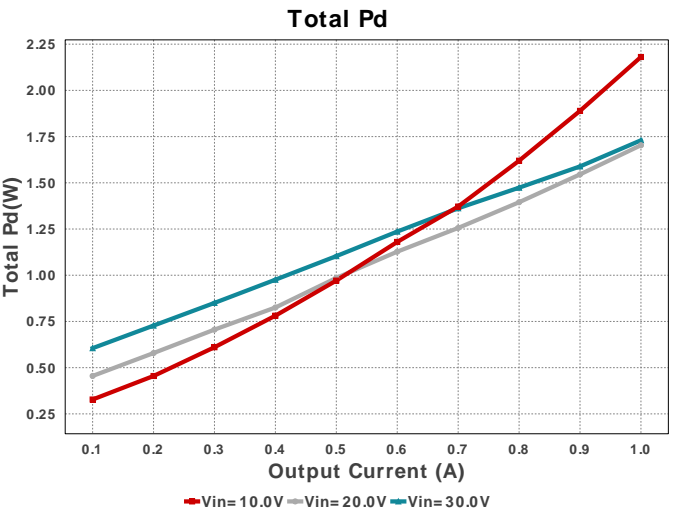
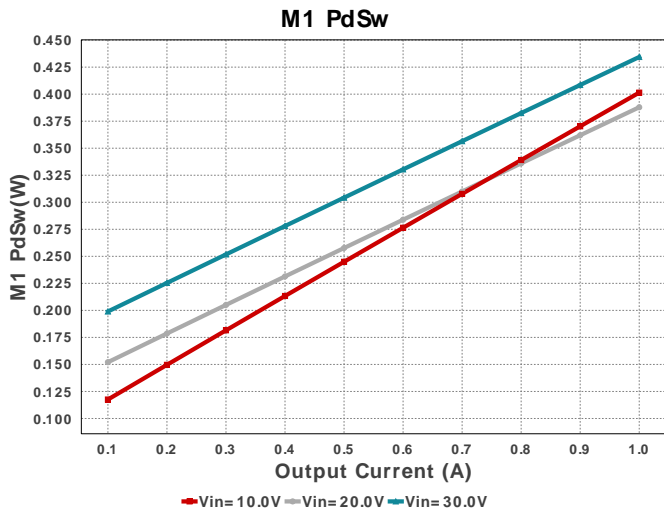
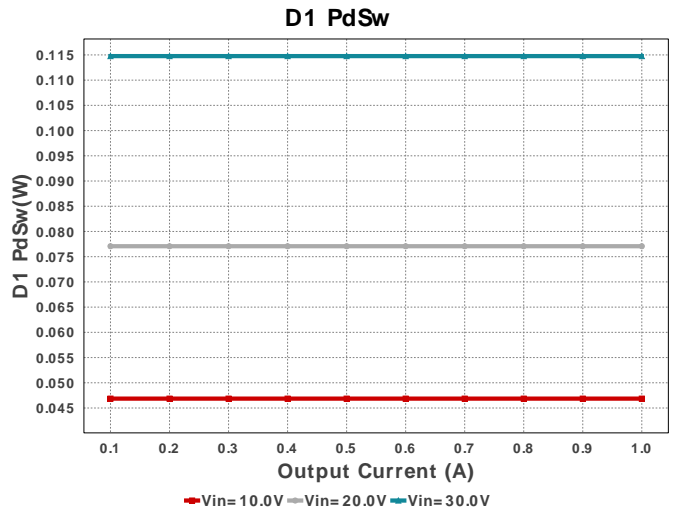
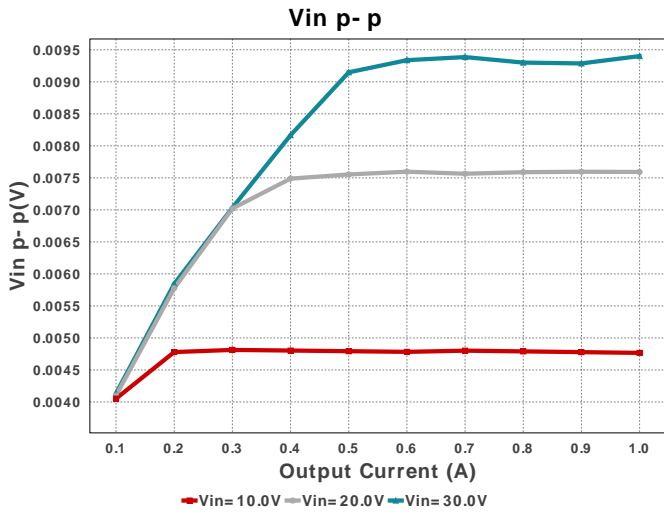
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Lcoup	Coiltronics	DRQ125-100-R	Lp= 10.0 µH Rp= 37.85 mOhm Leakage_L= 600.0 nH Ns1toNp= 1.0 Rs1= 37.85 mOhms	1	\$0.91	 DRQ125 210 mm²
M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	\$0.24	 PG-TDSON-8 55 mm²
Rcomp	Vishay-Dale	CRCW04021K18FKED Series= CRCW..e3	Res= 1.18 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
Rfadj	Yageo	RC0201FR-0723K7L Series= ?	Res= 23.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm²
Rfb1	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm²
Rfb2	Vishay-Dale	CRCW0402182KFKED Series= CRCW..e3	Res= 182.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
Rfilt	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
Rsense	Susumu Co Ltd	PRL1632-R007-F-T1 Series= PRL1632	Res= 7.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.20	 0612 11 mm²
Rvlo1	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm²
Rvlo2	Yageo	RC0201FR-07105KL Series= ?	Res= 105.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm²
U1	Texas Instruments	LM3481MM/NOPB	Switcher	1	\$0.80	 MUB10A 24 mm²

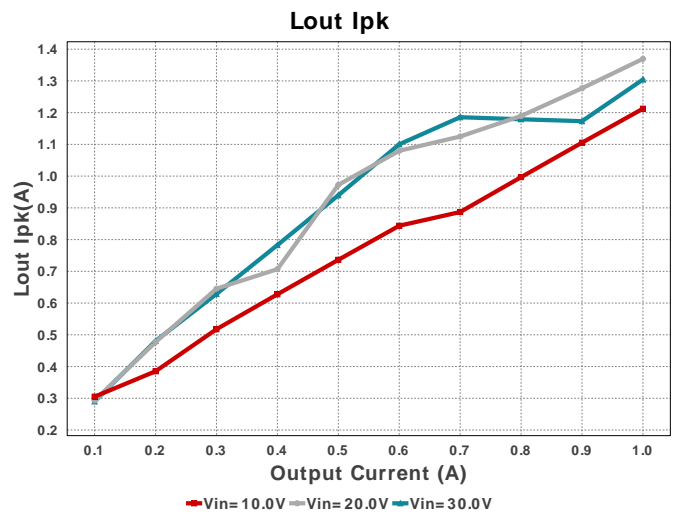
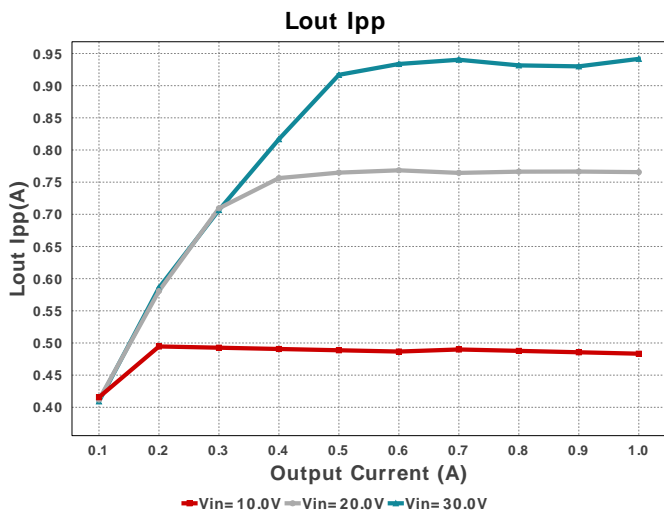
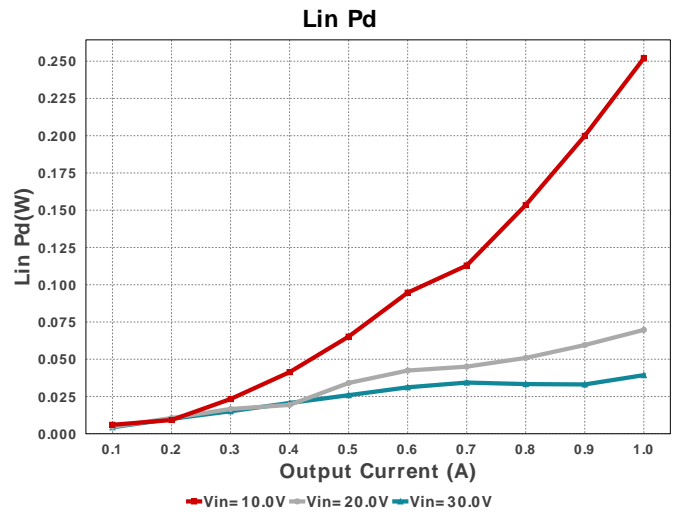
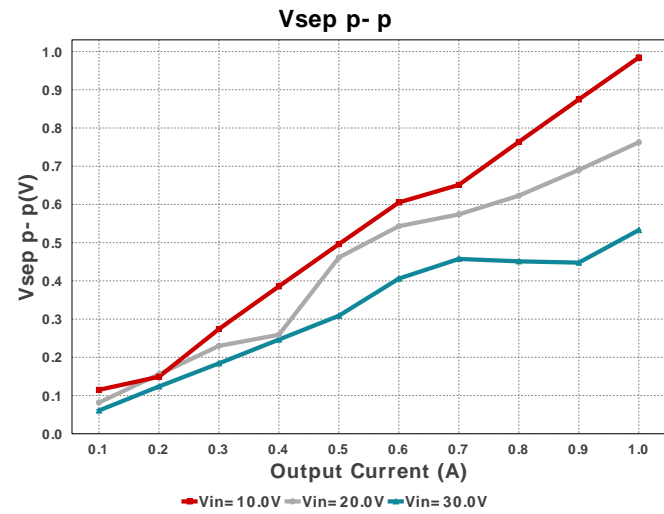
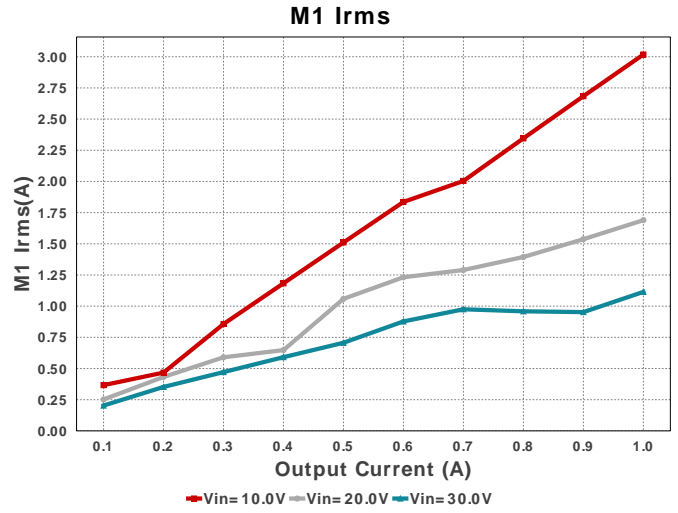
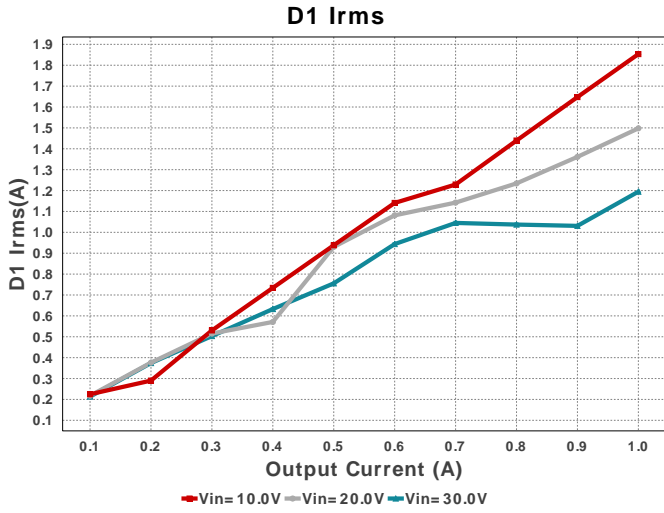


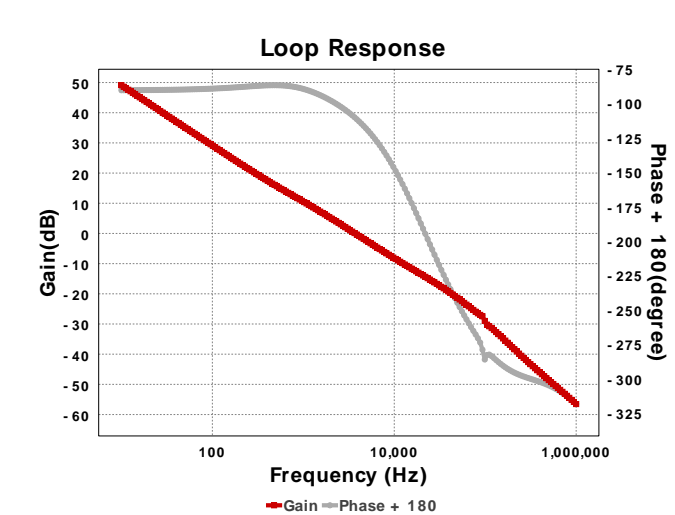
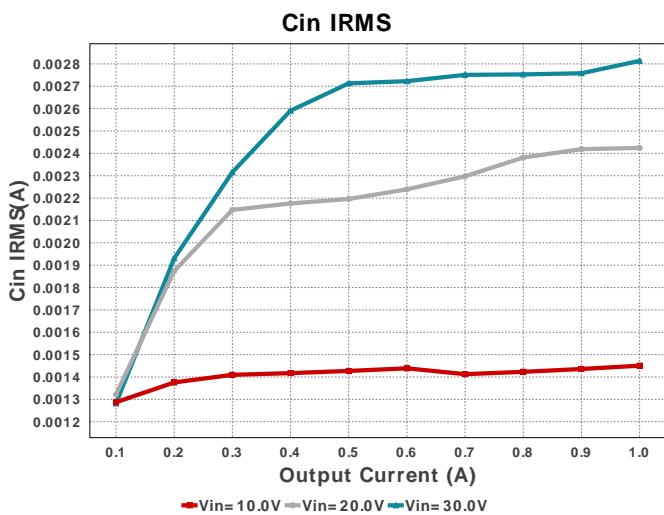
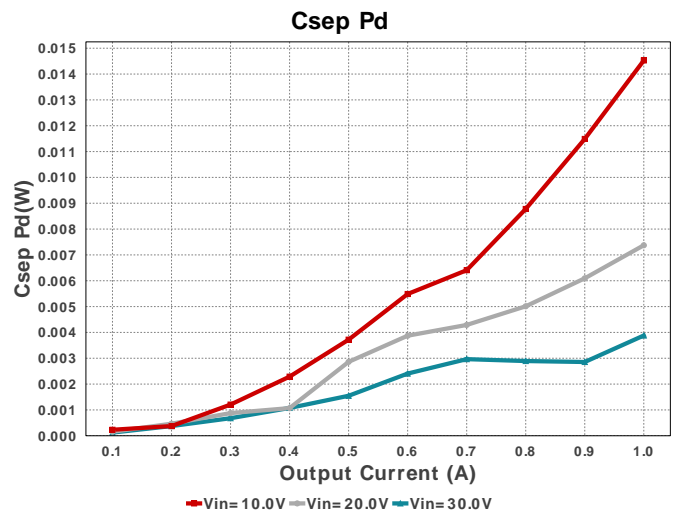
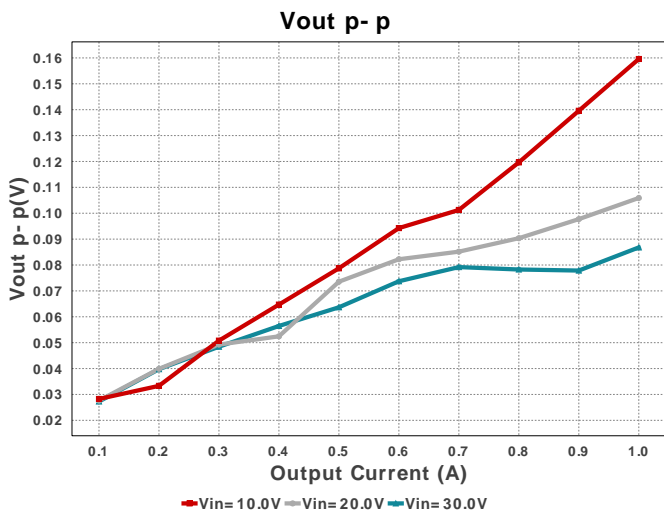
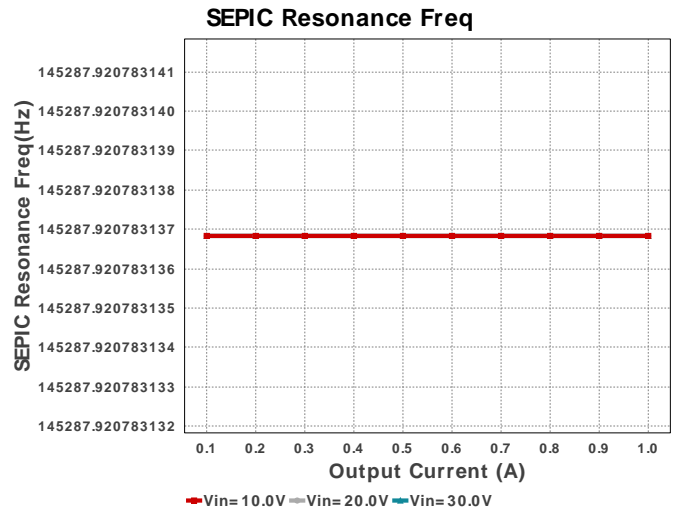
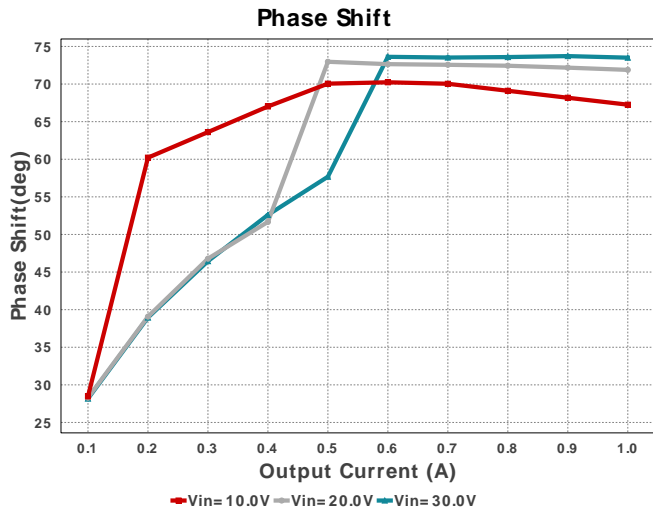












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	7	System Information	Total Design BOM count

Design Inputs

Name	Value	Description
lout	1.0	Maximum Output Current
VinMax	30.0	Maximum input voltage
VinMin	10.0	Minimum input voltage
Vout	24.5	Output Voltage
base_pn	LM3481	Base Product Number

Name	Value	Description
source	DC	Input Source Type
Ta	30.0	Ambient temperature
UserFsw	560.0 k	Customer Selected Frequency

WEBENCH® Assembly

Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of C_{in} and C_{out} , and the inductance and DC resistance of L1 before assembly of the board. Any large discrepancies in values should be electrically simulated in WEBENCH to check for instabilities and thermally simulated in WebTHERM to make sure critical temperatures are not exceeded.

Soldering Component to Board

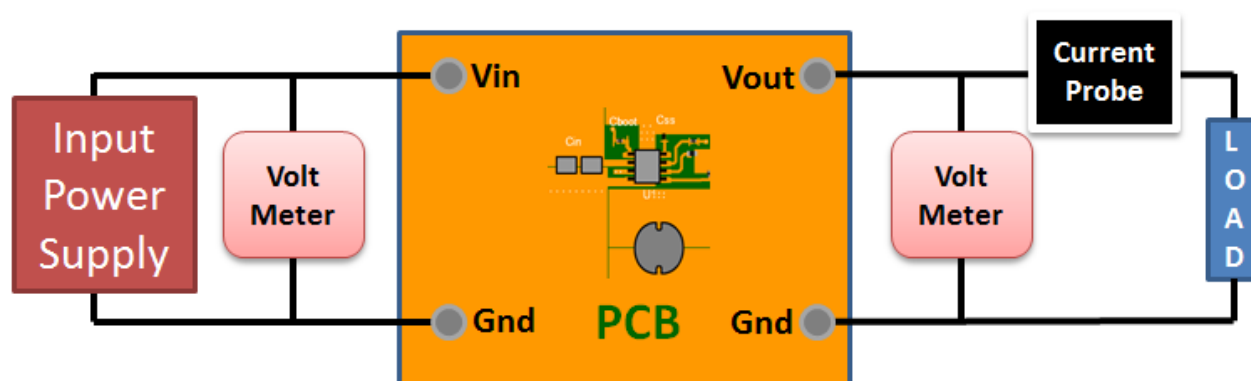
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab down to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

Initial Startup of Circuit

It is best to initially power up the board by setting the input supply voltage to the lowest operating input voltage 10.0V and set the input supply's current limit to zero. With the input supply off connect up the input supply to V_{in} and GND. Connect a digital volt meter and a load if needed to set the minimum load of the design from V_{out} and GND. Turn on the input supply and slowly turn up the current limit on the input supply. If the voltage starts to rise on the input supply continue increasing the input supply current limit while watching the output voltage. If the current increases on the input supply, but the voltage remains near zero, then there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the power supply circuit is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

Load Testing

The setup is the same as the initial startup, except that an additional digital voltmeter is connected between V_{in} and GND, a load is connected between V_{out} and GND and a current meter is connected in series between V_{out} and the load. The load must be able to handle at least rated output power + 50% (7.5 watts for this design). Ideally the load is supplied in the form of a variable load test unit. It can also be done in the form of suitably large power resistors. When using an oscilloscope to measure waveforms on the prototype board, the ground leads of the oscilloscope probes should be as short as possible and the area of the loop formed by the ground lead should be kept to a minimum. This will help reduce ground lead inductance and eliminate EMI noise that is not actually present in the circuit.



Design Assistance

1. Master key : 18BFA29751ABA51A[v1]
2. **LM3481** Product Folder : <http://www.ti.com/product/LM3481> : contains the data sheet and other resources.

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