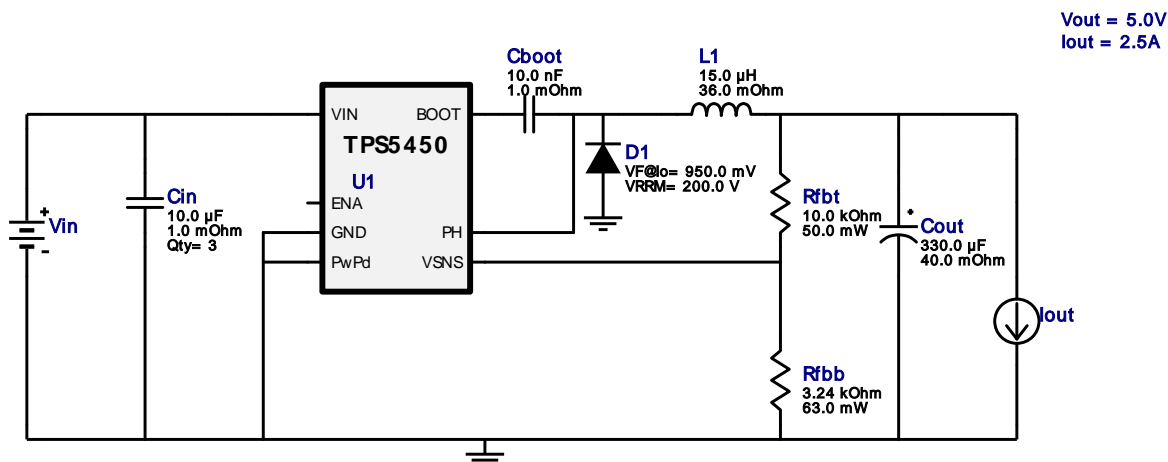



## WEBENCH® Design Report

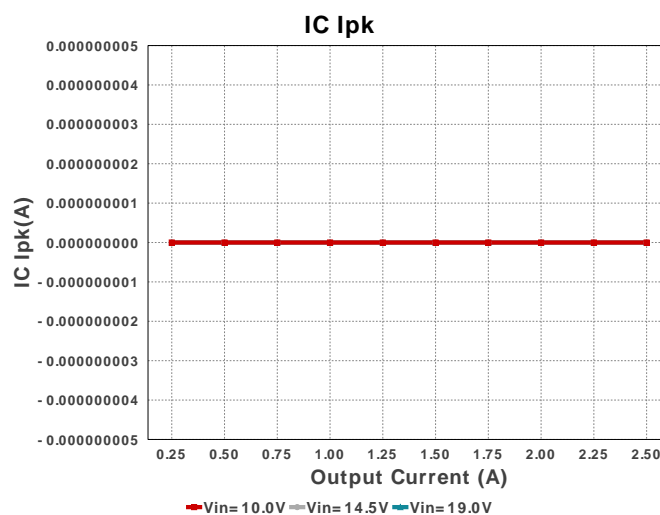
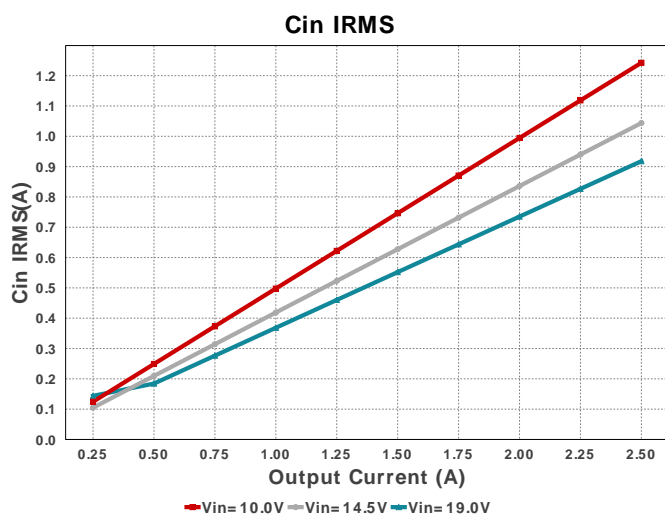
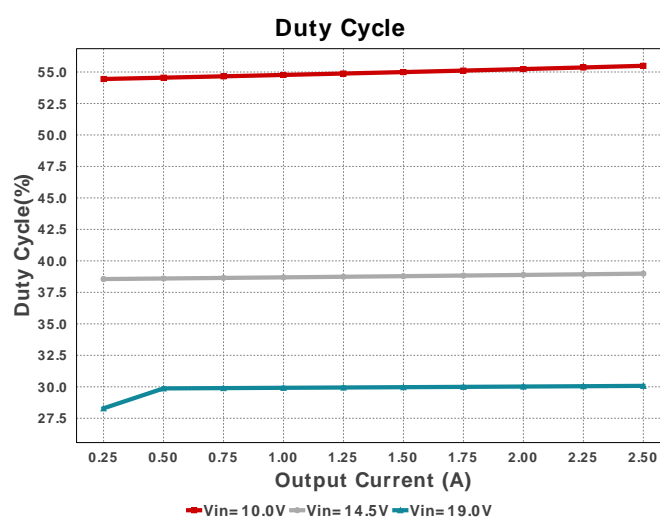
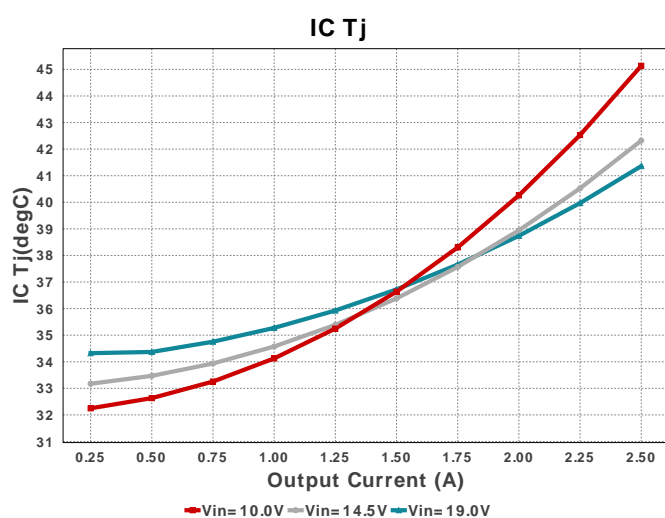
TPS5450DDAR 10V-19V to 5.00V @ 2.5A

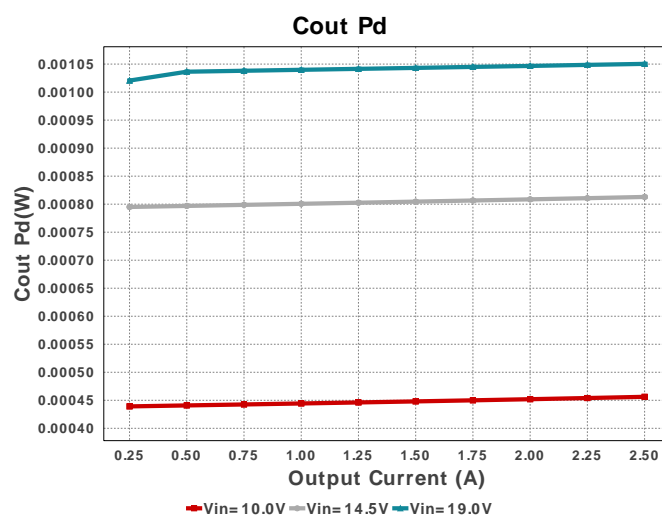
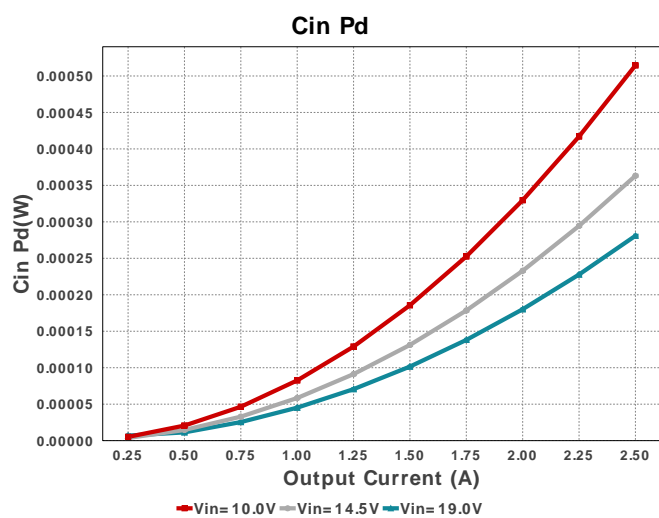
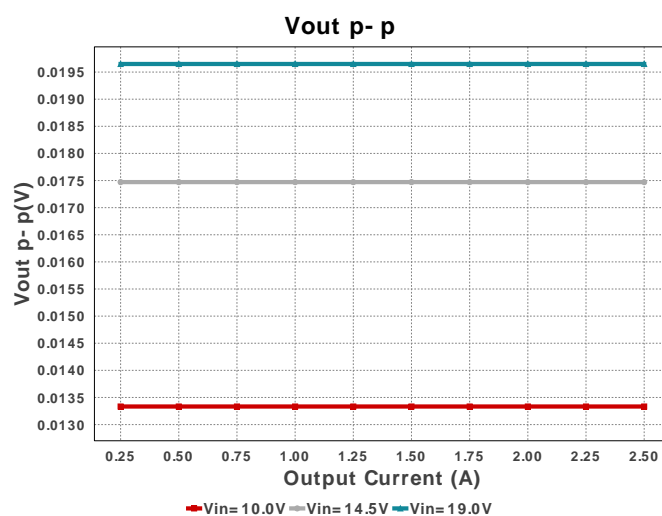
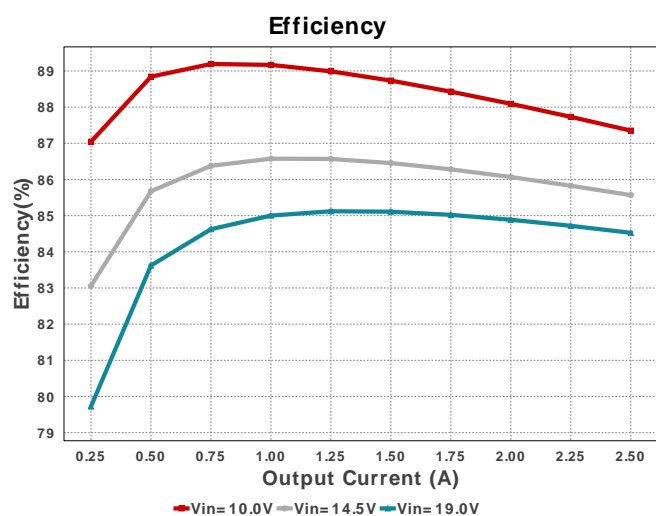
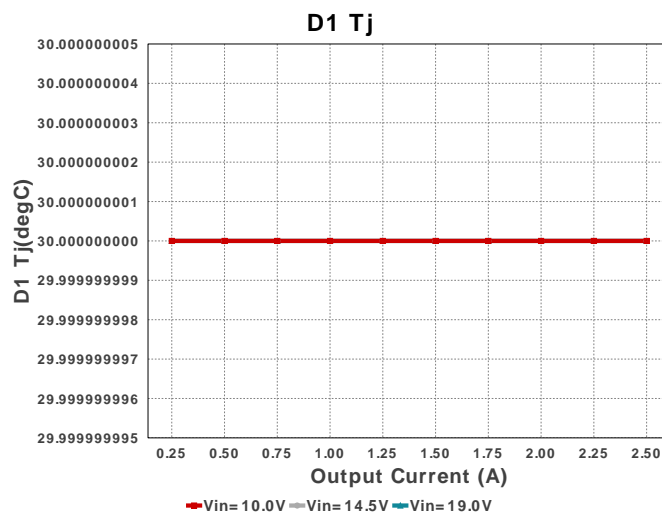
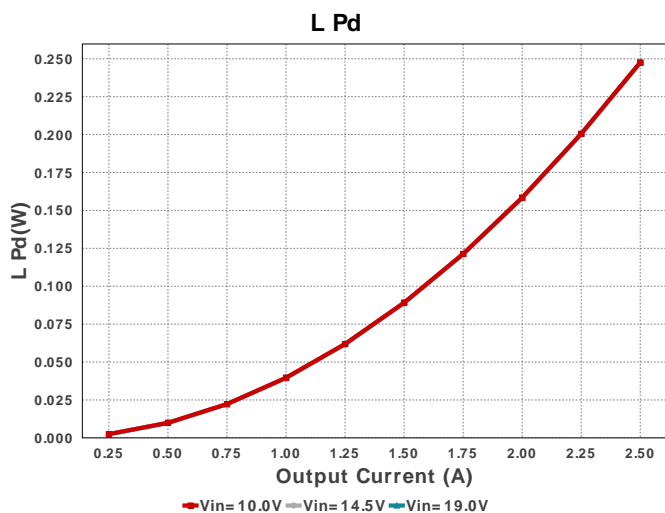


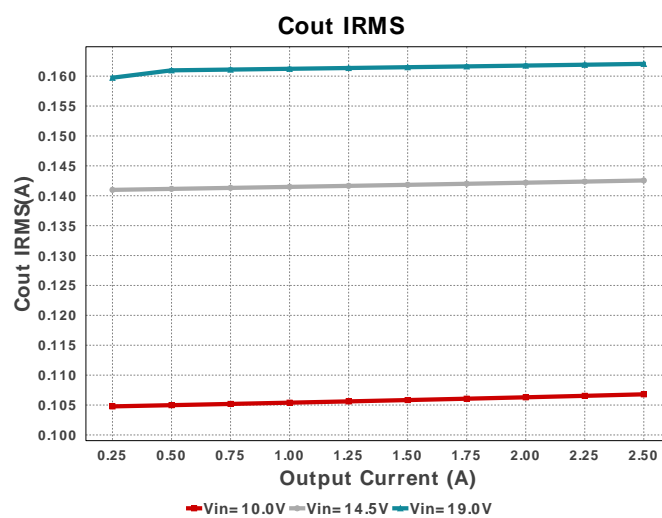
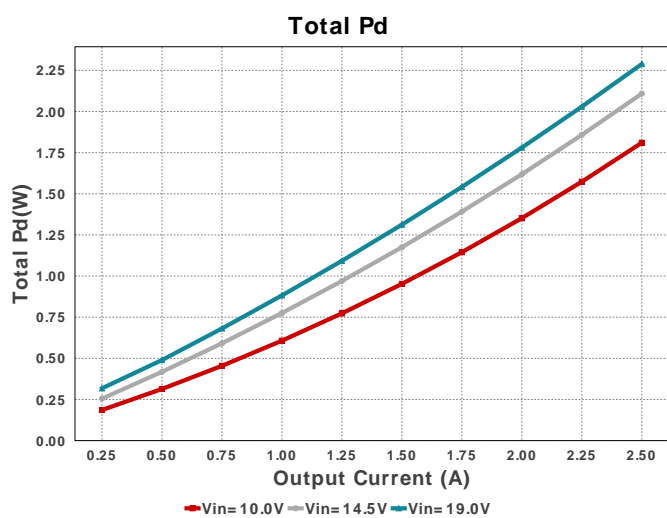
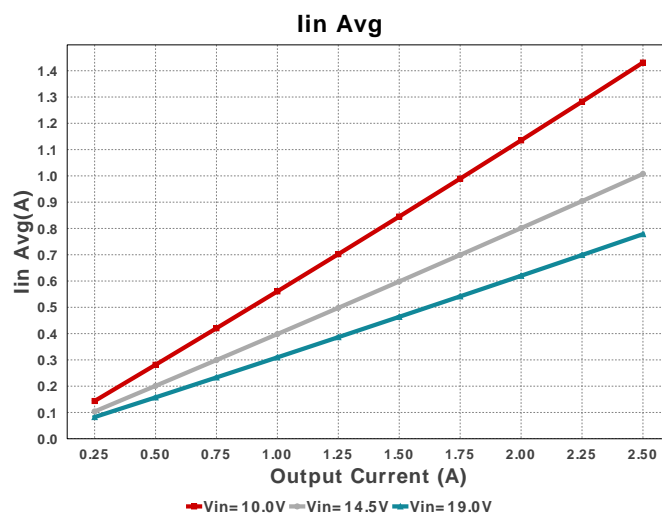
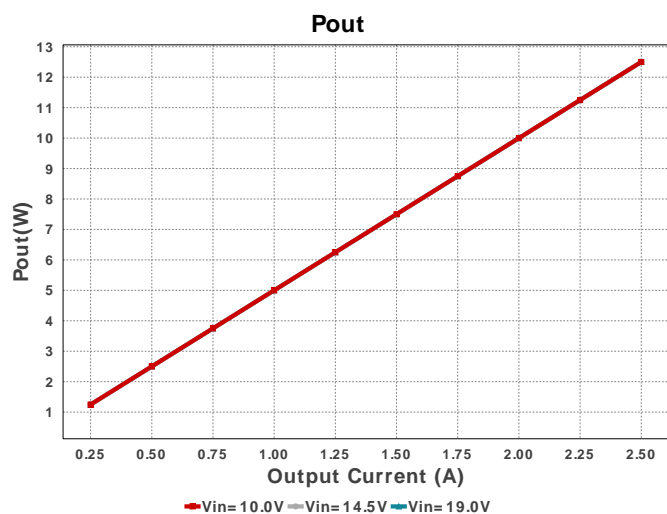
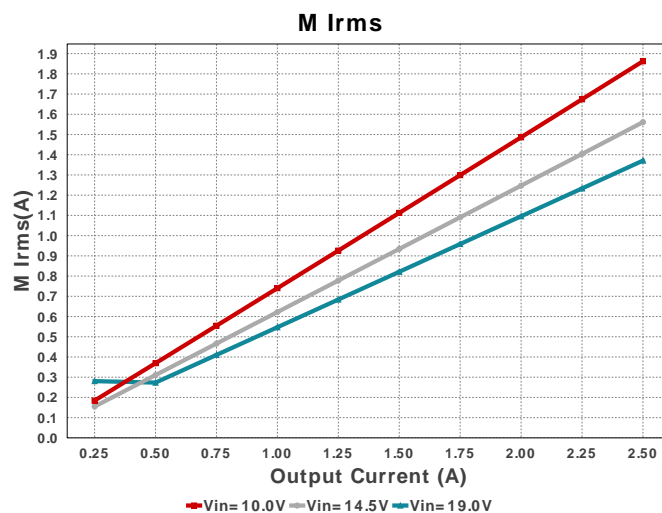
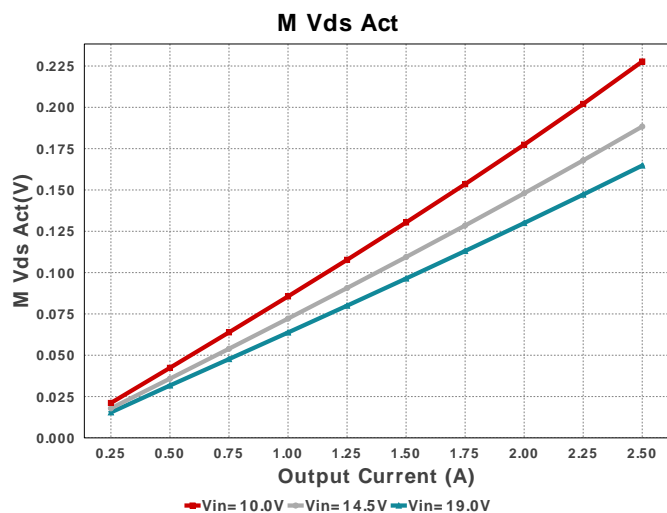
## Electrical BOM

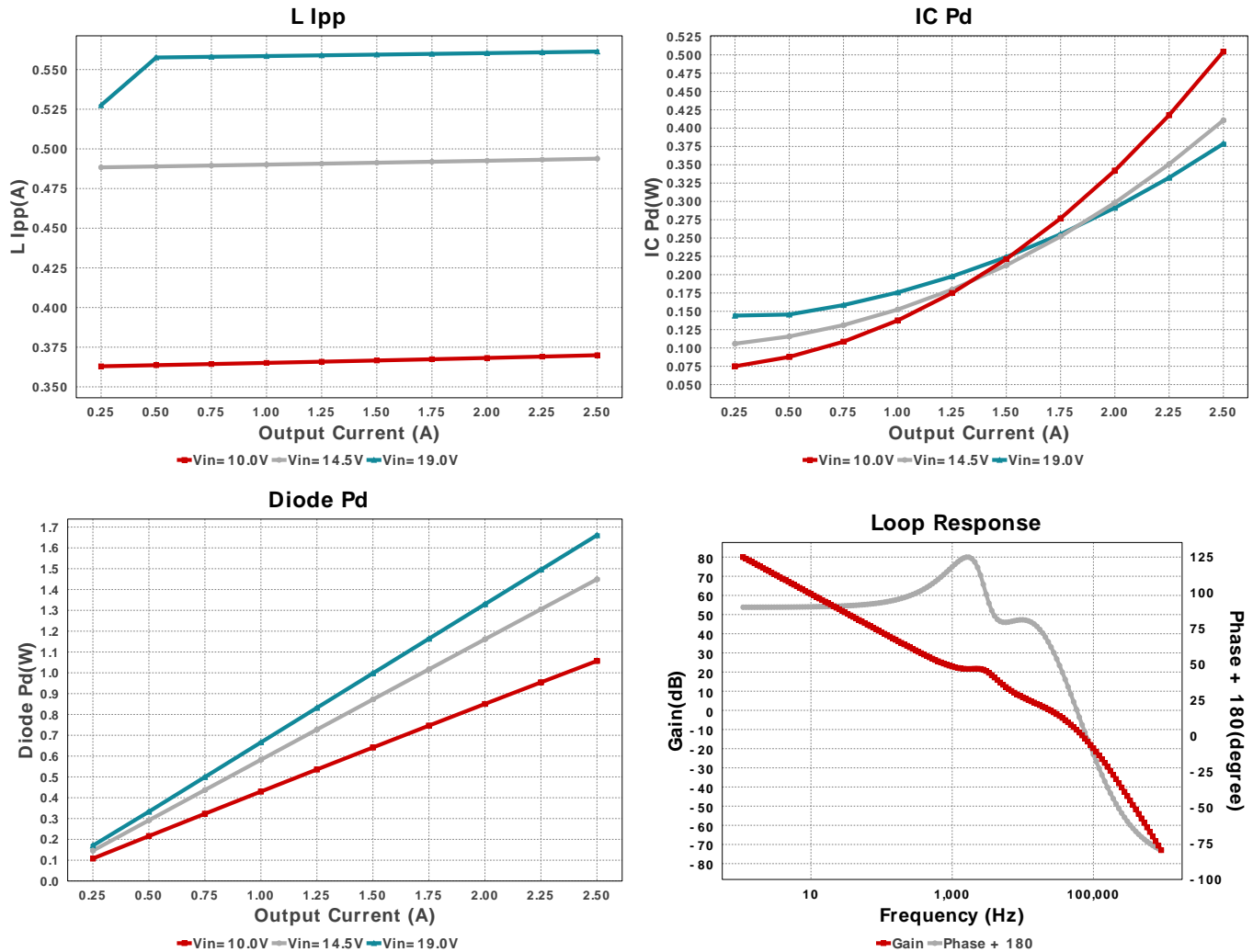
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Yageo	CC0805KRX7R9BB103 Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm <sup>2</sup>
2.	Cin	TDK	C3225X7R1H106M250AC Series= X7R	Cap= 10.0 uF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 5.0 A	3	\$0.28	 1210 15 mm <sup>2</sup>
3.	Cout	Panasonic	6TPC330MA Series= TPC	Cap= 330.0 uF ESR= 40.0 mOhm VDC= 6.3 V IRMS= 1.9 A	1	\$0.50	 7343-20 59 mm <sup>2</sup>
4.	D1	SMC Diode Solutions	SBRD10200TR	VF@Io= 950.0 mV VRRM= 200.0 V	1	\$0.12	 DPAK 102 mm <sup>2</sup>
5.	L1	NIC Components	NPI52W150MTRF	L= 15.0 µH DCR= 36.0 mOhm	1	\$0.35	 IND_NPI52W 358 mm <sup>2</sup>
6.	Rfbb	Vishay-Dale	CRCW04023K24FKED Series= CRCW..e3	Res= 3240.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
7.	Rfbt	Yageo	RC0201FR-0710KL Series= ?	Res= 10000.0Ohm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	TPS5450DDAR	Switcher	1	\$2.00	 R-PDSO-G8 55 mm <sup>2</sup>









## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	917.956 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	280.88 $\mu$ W	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	162.051 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	1.05 mW	Capacitor	Output capacitor power dissipation
5.	D1 Tj	30.0 degC	Diode	D1 junction temperature
6.	Diode Pd	1.661 W	Diode	Diode power dissipation
7.	IC Ipk	0.0 A	IC	Peak switch current in IC
8.	IC Pd	378.7 mW	IC	IC power dissipation
9.	IC Tj	41.361 degC	IC	IC junction temperature
10.	IC Tolerance	18.315 mV	IC	IC Feedback Tolerance
11.	ICThetaJA	30.0 degC/W	IC	IC junction-to-ambient thermal resistance
12.	Iin Avg	778.33 mA	IC	Average input current
13.	L Ipp	561.36 mA	Inductor	Peak-to-peak inductor ripple current
14.	L Pd	247.5 mW	Inductor	Inductor power dissipation
15.	M Irms	1.371 A	Mosfet	MOSFET RMS ripple current
16.	M Vds Act	164.781 mV	Mosfet	Voltage drop across the MosFET
17.	Cin Pd	280.88 $\mu$ W	Power	Input capacitor power dissipation
18.	Cout Pd	1.05 mW	Power	Output capacitor power dissipation
19.	Diode Pd	1.661 W	Power	Diode power dissipation
20.	IC Pd	378.7 mW	Power	IC power dissipation
21.	L Pd	247.5 mW	Power	Inductor power dissipation
22.	Total Pd	2.288 W	Power	Total Power Dissipation
23.	BOM Count	10	System	Total Design BOM count
24.	Cross Freq	24.523 kHz	System	Bode plot crossover frequency
25.	Duty Cycle	30.073 %	System	Duty cycle
26.	Efficiency	84.526 %	System	Steady state efficiency
27.	FootPrint	630.0 mm <sup>2</sup>	System	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
28.	Frequency	500.0 kHz	System Information	Switching frequency
29.	Iout	2.5 A	System Information	Iout operating point
30.	Mode	CCM	System Information	Conduction Mode
31.	Phase Marg	63.191 deg	System Information	Bode Plot Phase Margin
32.	Pout	12.5 W	System Information	Total output power
33.	Total BOM	\$3.84	System Information	Total BOM Cost
34.	Vin	19.0 V	System Information	Vin operating point
35.	Vout	5.0 V	System Information	Operational Output Voltage
36.	Vout Actual	4.99 V	System Information	Vout Actual calculated based on selected voltage divider resistors
37.	Vout Tolerance	3.049 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
38.	Vout p-p	19.649 mV	System Information	Peak-to-peak output ripple voltage

## Design Inputs

#	Name	Value	Description
1.	Iout	2.5	Maximum Output Current
2.	VinMax	19.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	acFrequency	60.0	AC Frequency
6.	base_pn	TPS5450	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	30.0	Ambient temperature

## Design Assistance

1. Feature Highlights: 5A, 500kHz Fixed Switching Frequency, Internal Compensation
2. **TPS5450** Product Folder : <http://www.ti.com/product/TPS5450> : contains the data sheet and other resources.

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