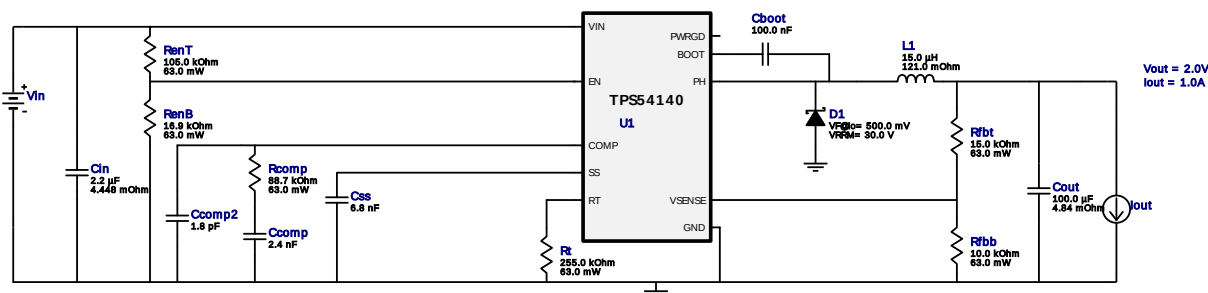


WEBENCH® Design Report

Design : 4728750/8 TPS54140DGQR
TPS54140DGQR 10.0V-20.0V to 2.00V @ 1.0A

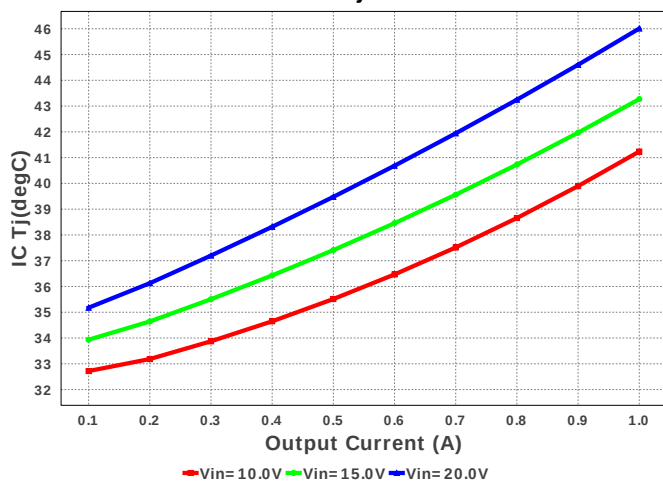


Electrical BOM

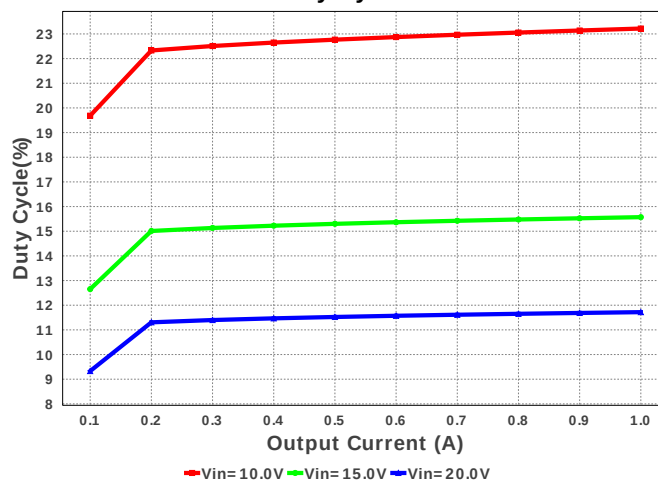
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Ccomp	MuRata	GRM1885C1H242JA01D Series= C0G/NP0	Cap= 2.4 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
3.	Ccomp2	MuRata	GRM1555C1H1R8CA01D Series= C0G/NP0	Cap= 1.8 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
4.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	 1206_190 11 mm ²
5.	Cout	MuRata	GRM31CD80G107ME39L Series= X6T	Cap= 100.0 uF ESR= 4.84 mOhm VDC= 4.0 V IRMS= 4.3381 A	1	\$0.14	 1206_190 11 mm ²
6.	Css	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
7.	D1	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	\$0.09	 SMA 37 mm ²
8.	L1	Bourns	SRP6540-150M	L= 15.0 uH DCR= 121.0 mOhm	1	\$0.60	 SRP6540 83 mm ²
9.	Rcomp	Vishay-Dale	CRCW040288K7FKED Series= CRCW..e3	Res= 88.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	RenB	Vishay-Dale	CRCW040216K9FKED Series= CRCW..e3	Res= 16.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	RenT	Vishay-Dale	CRCW0402105KFKED Series= CRCW..e3	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	Rfbt	Vishay-Dale	CRCW040215K0FKED Series= CRCW..e3	Res= 15.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	Rt	Vishay-Dale	CRCW0402255KFKED Series= CRCW..e3	Res= 255.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
15.	U1	Texas Instruments	TPS54140DGQR	Switcher	1	\$1.26	 S-PDSO-G10 24 mm ²

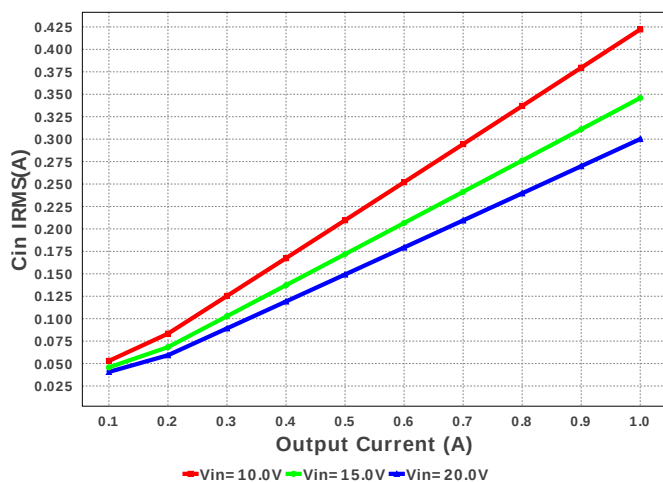
IC Tj



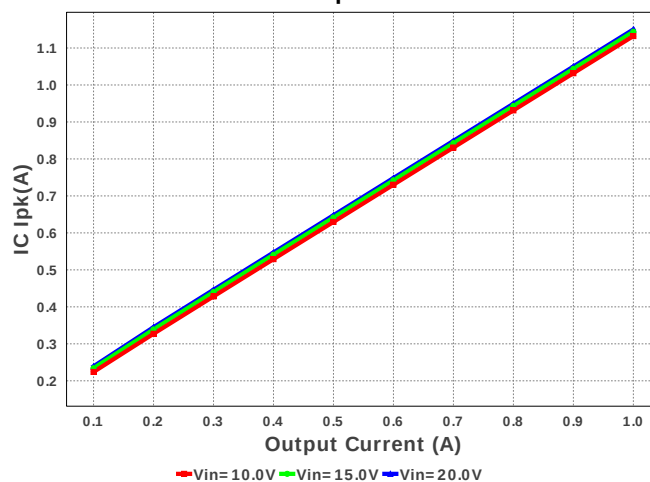
Duty Cycle

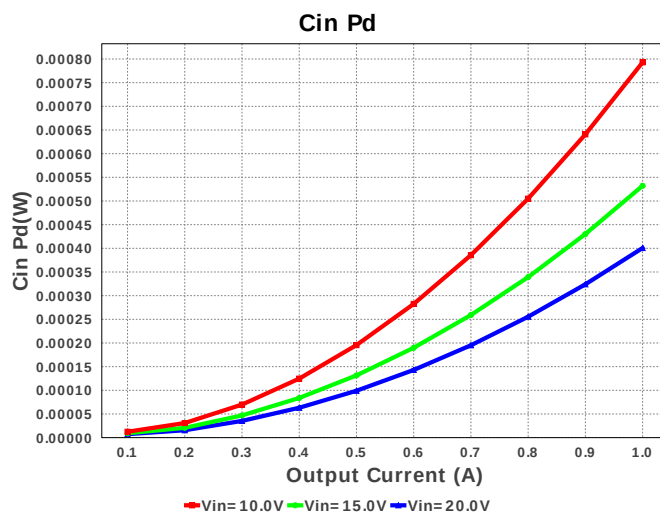
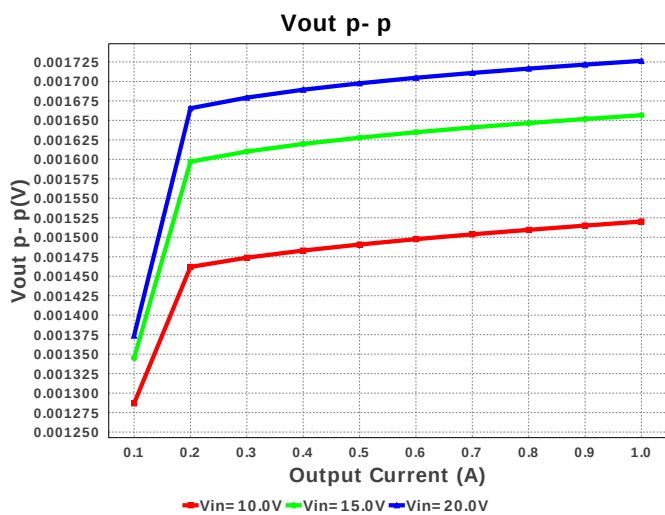
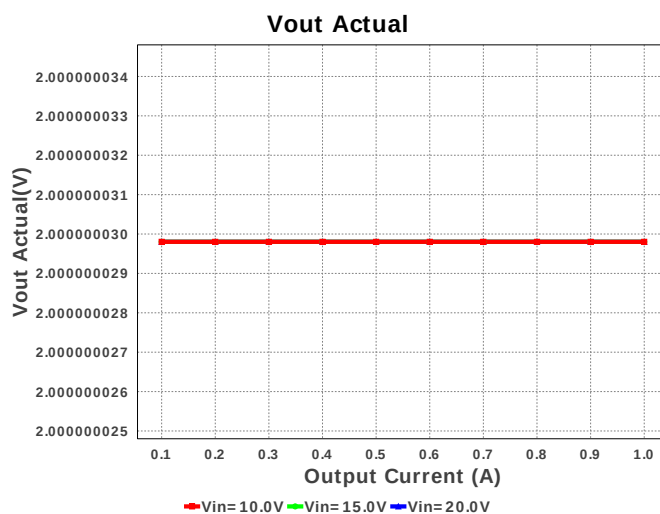
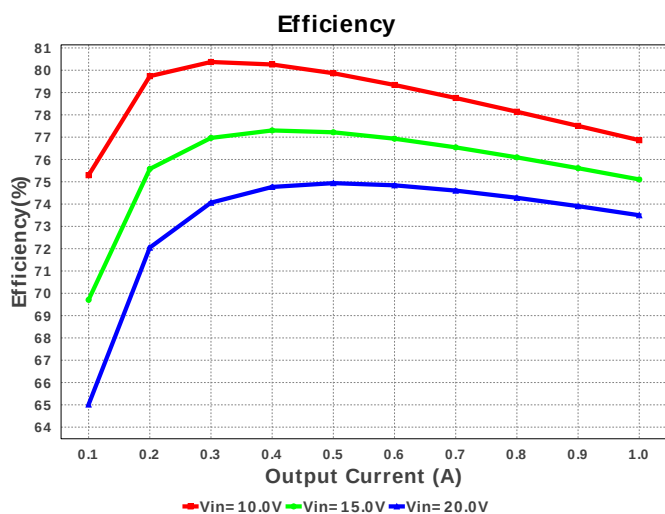
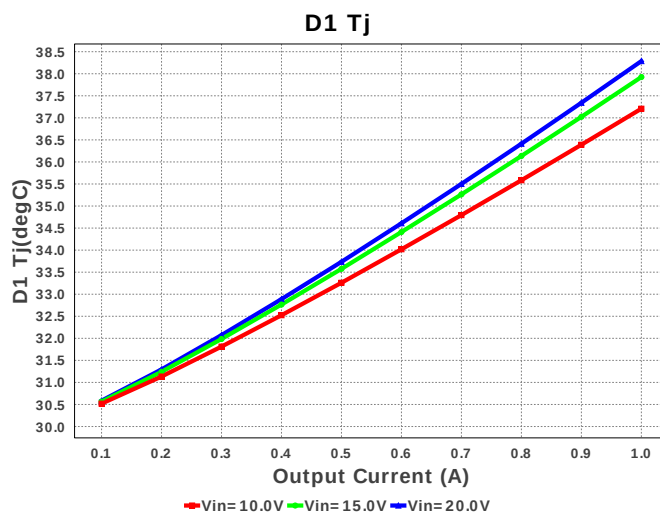
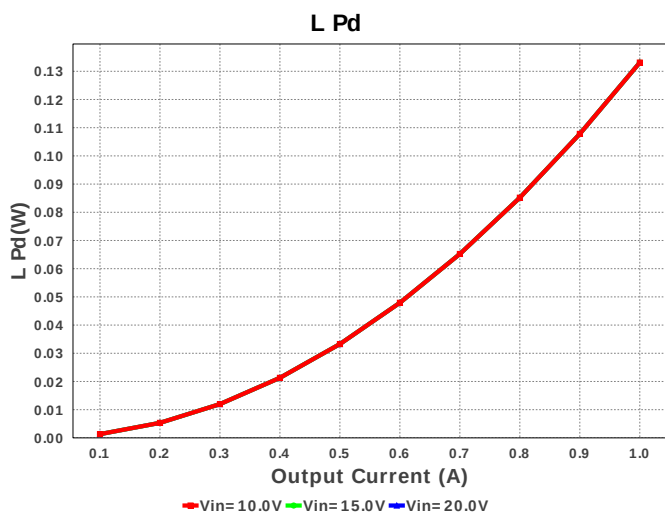


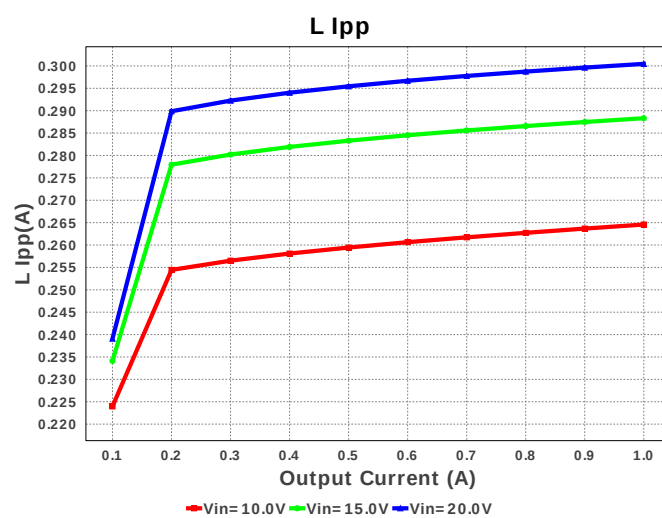
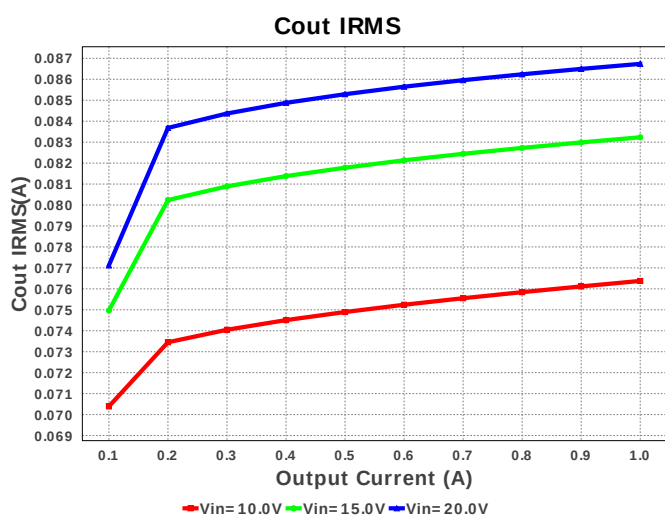
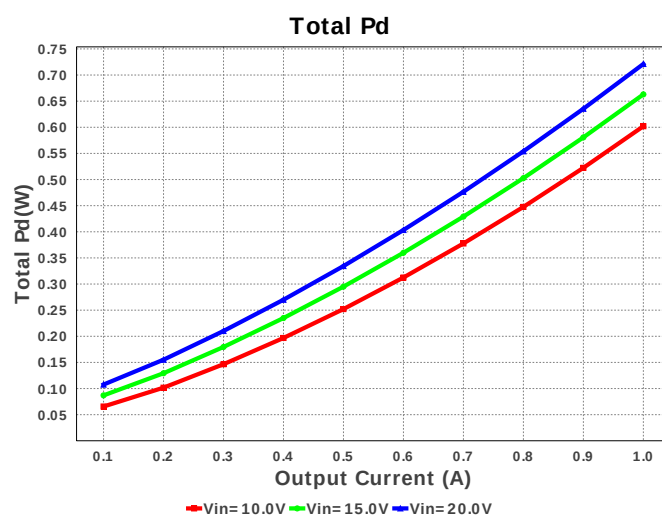
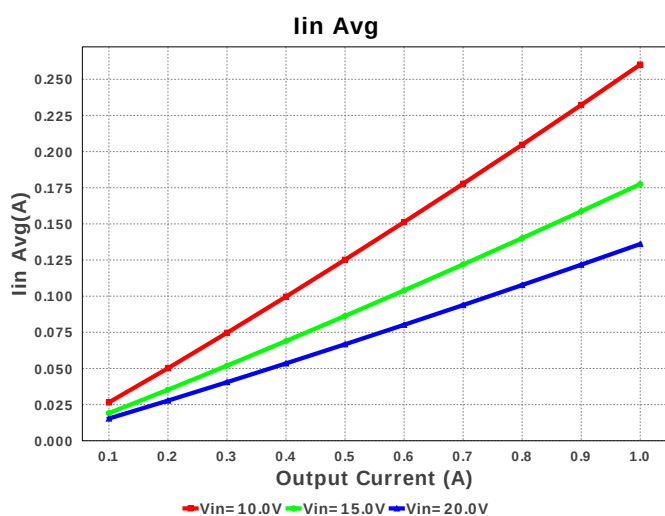
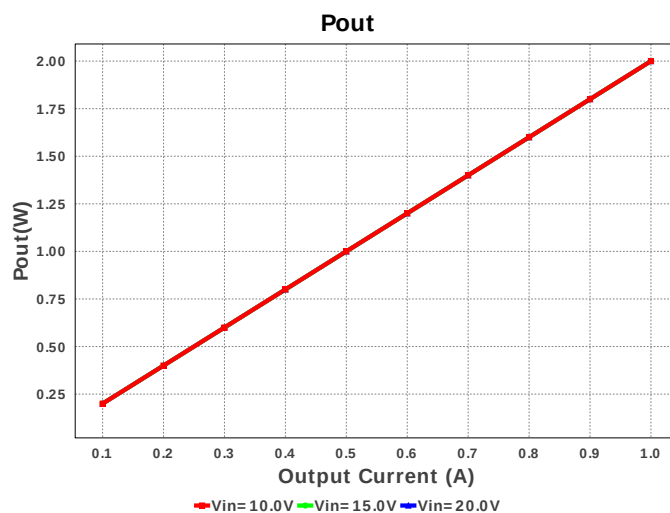
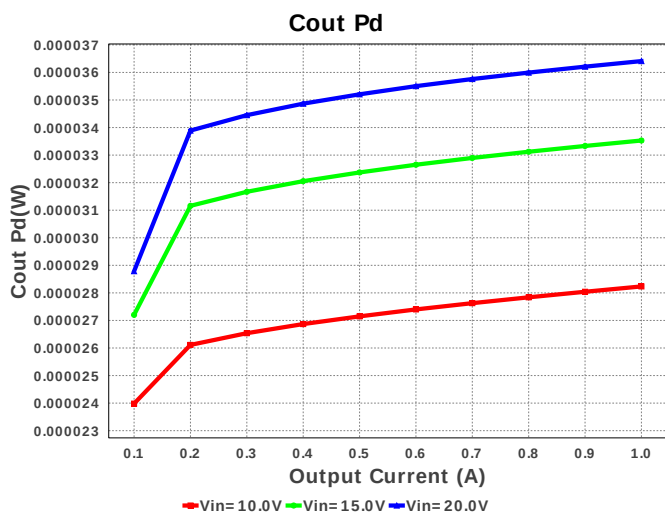
Cin IRMS

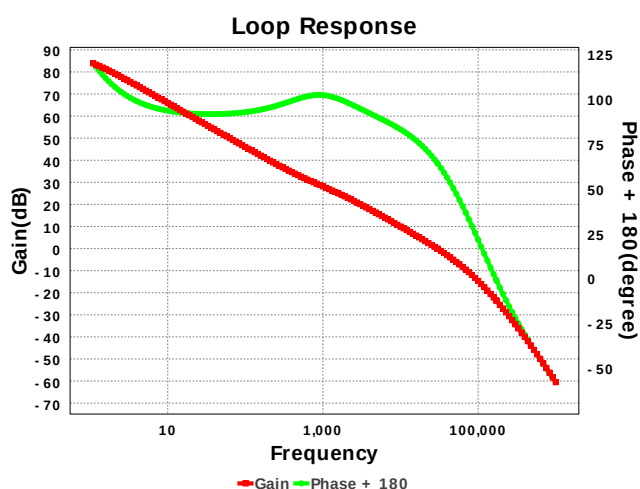
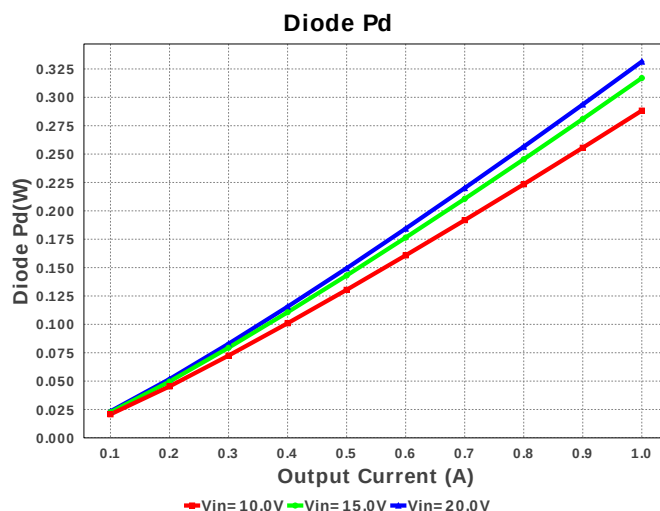
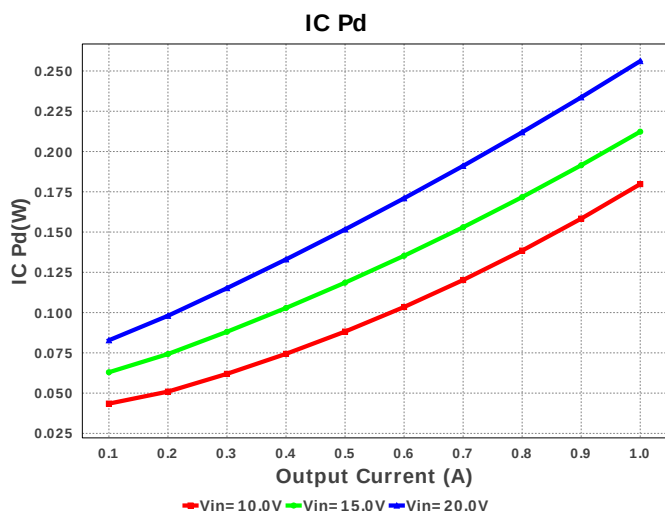


IC Ipk









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	300.778 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	87.238 mA	Current	Output capacitor RMS ripple current
3.	IC IpK	1.0 A	Current	Peak switch current in IC
4.	Iin Avg	136.74 mA	Current	Average input current
5.	L Ipp	302.2 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	15	General	Total Design BOM count
7.	FootPrint	201.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	468.033 kHz	General	Switching frequency
9.	Pout	2.0 W	General	Total output power
10.	Total BOM	\$2.24	General	Total BOM Cost
11.	D1 Tj	38.623 degC	Op_Point	D1 junction temperature
12.	Low Freq Gain	83.839 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	2.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	2.0 V	Op_Point	Operational Output Voltage
15.	Cross Freq	29.614 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	11.787 %	Op_point	Duty cycle
17.	Efficiency	73.131 %	Op_point	Steady state efficiency
18.	Gain Marg	-23.495 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	46.021 degC	Op_point	IC junction temperature
20.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	1.0 A	Op_point	Iout operating point
22.	Phase Marg	64.391 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	20.0 V	Op_point	Vin operating point
24.	Vout p-p	1.736 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	402.4 μW	Power	Input capacitor power dissipation
26.	Cout Pd	36.834 μW	Power	Output capacitor power dissipation
27.	Diode Pd	344.938 mW	Power	Diode power dissipation
28.	IC Pd	256.343 mW	Power	IC power dissipation
29.	L Pd	133.1 mW	Power	Inductor power dissipation
30.	Total Pd	734.813 mW	Power	Total Power Dissipation

#	Name	Value	Category	Description
31.	Vout Tolerance	2.224 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	20.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	2.0	Output Voltage
5.	base_pn	TPS54140	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54140** Product Folder : <http://www.ti.com/product/TPS54140> : contains the data sheet and other resources.

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