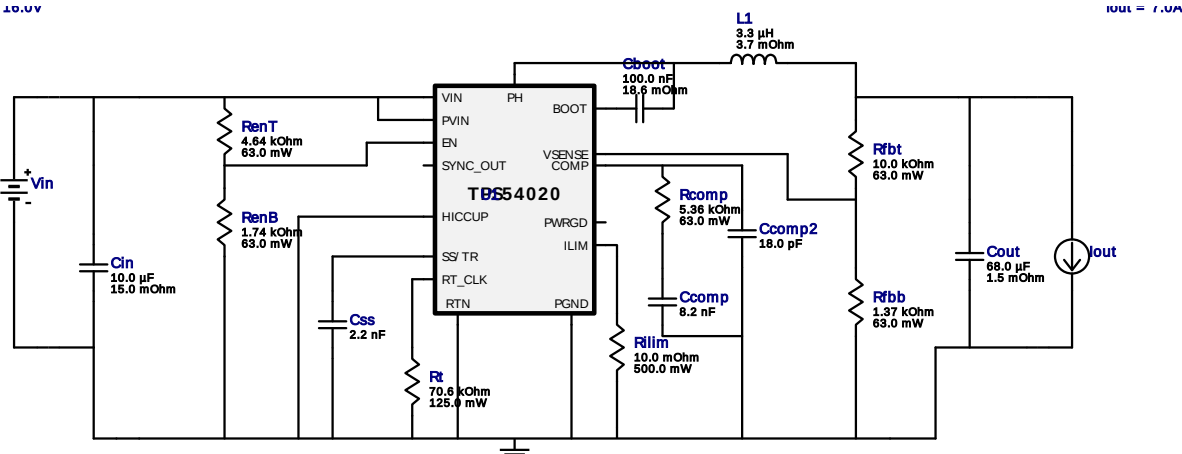


WEBENCH® Design Report

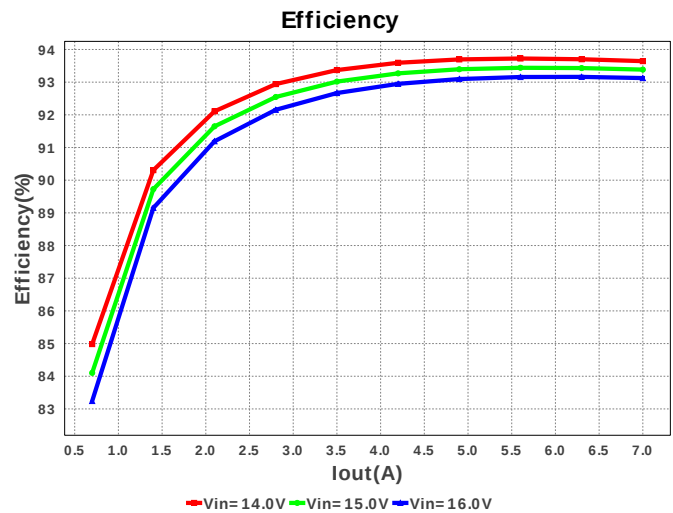
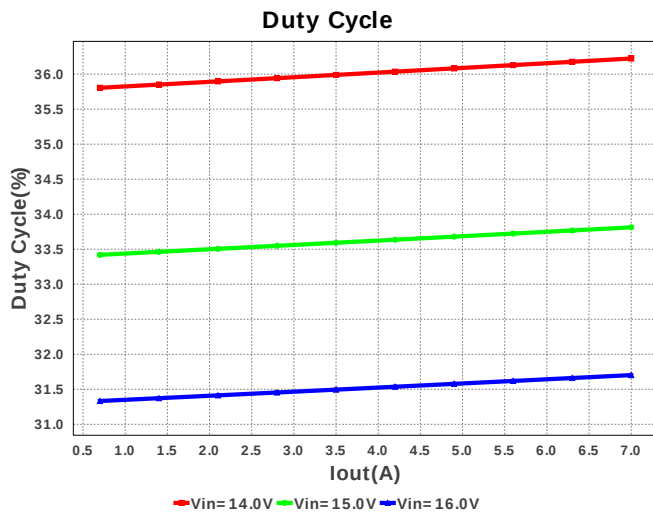
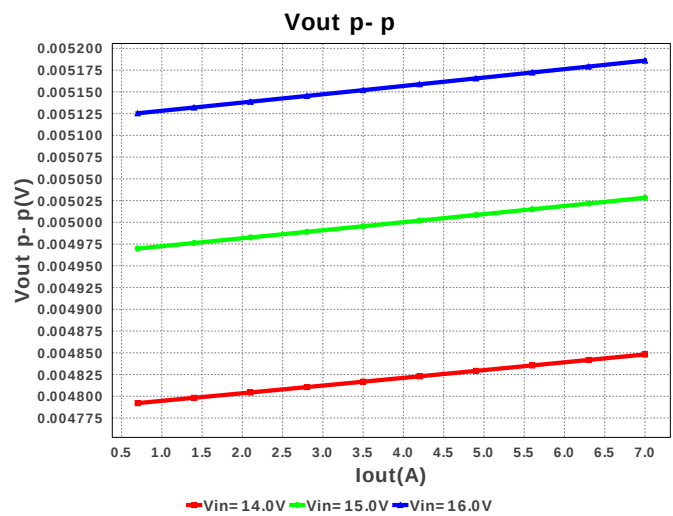
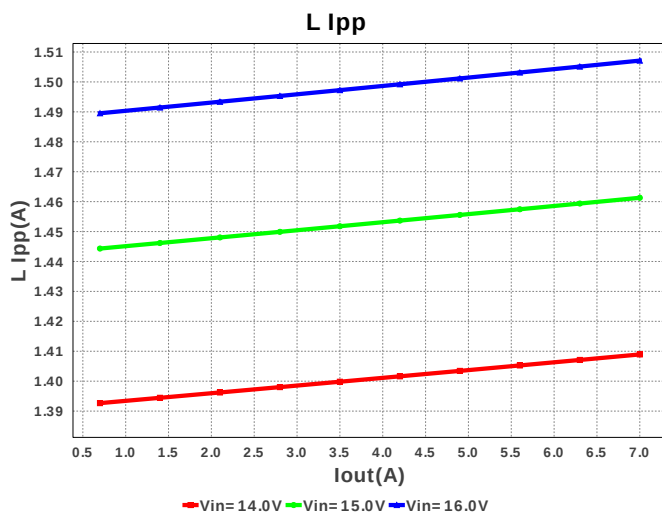
Design : 3562831/6 TPS54020RUWR
TPS54020RUWR 14.0V-16.0V to 5.0V @ 7.0A
VINMIN = 14.0V

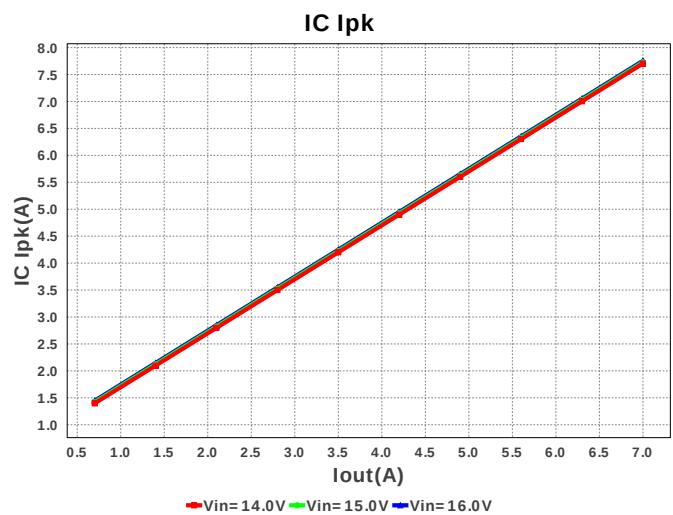
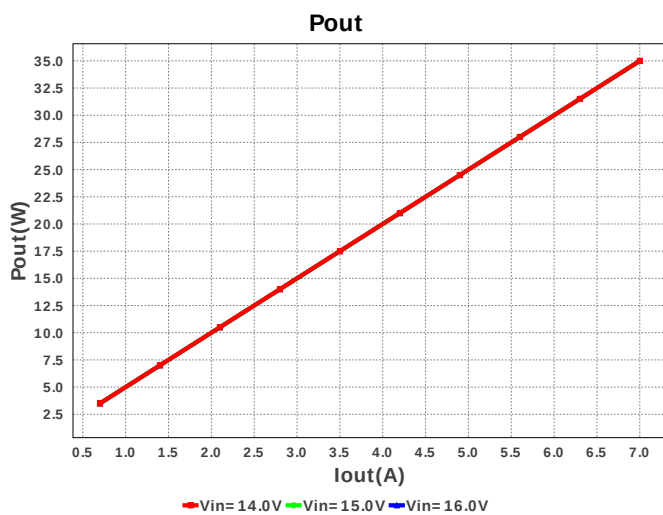
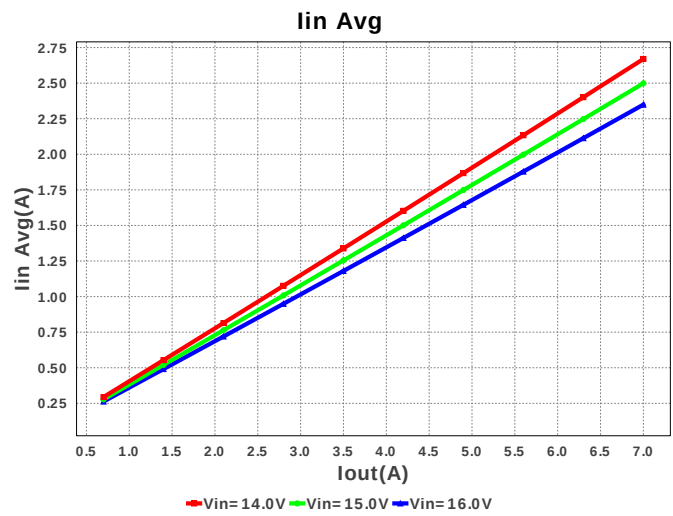
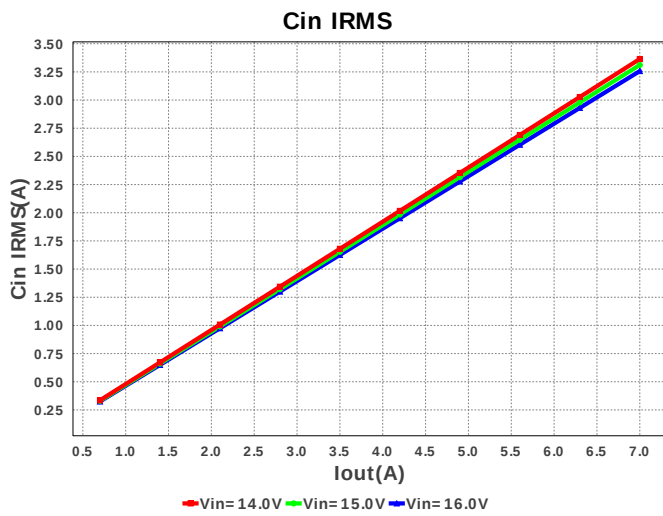
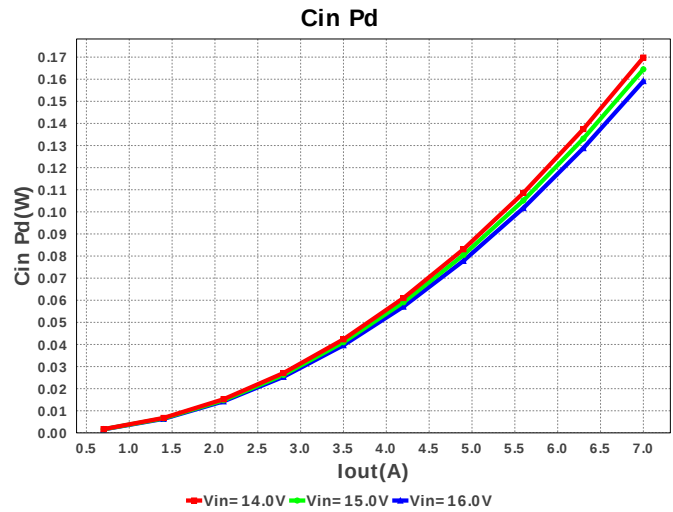
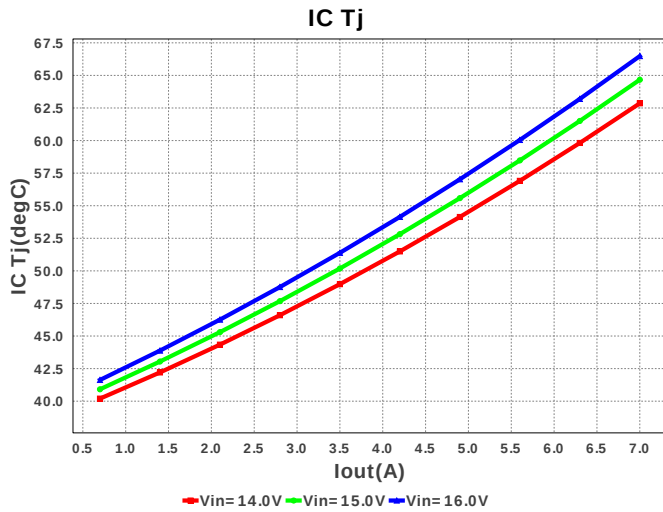


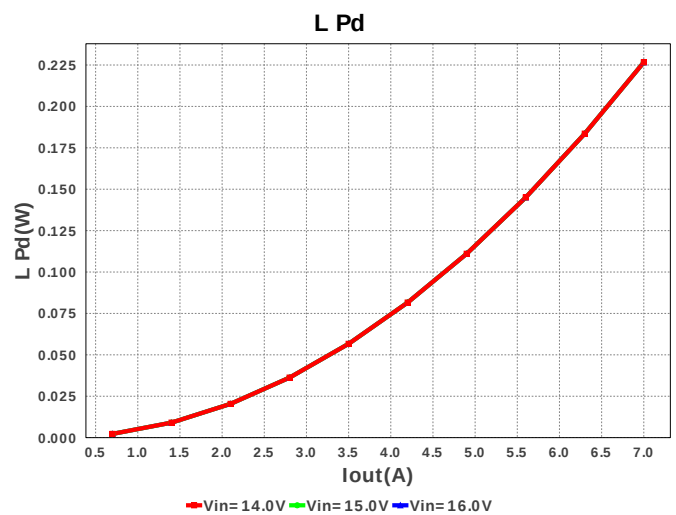
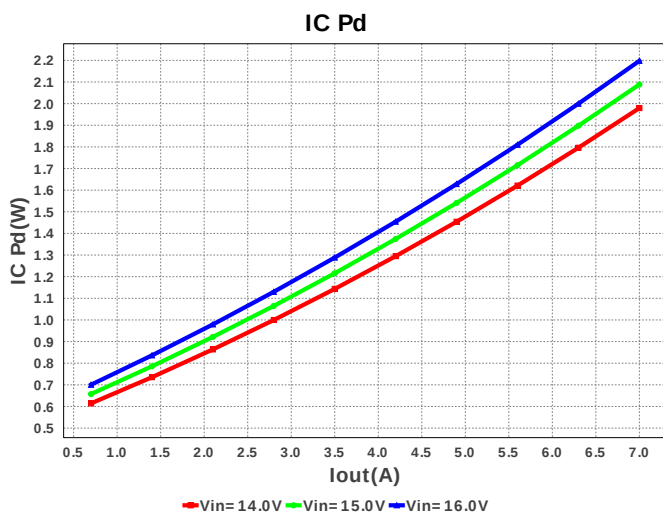
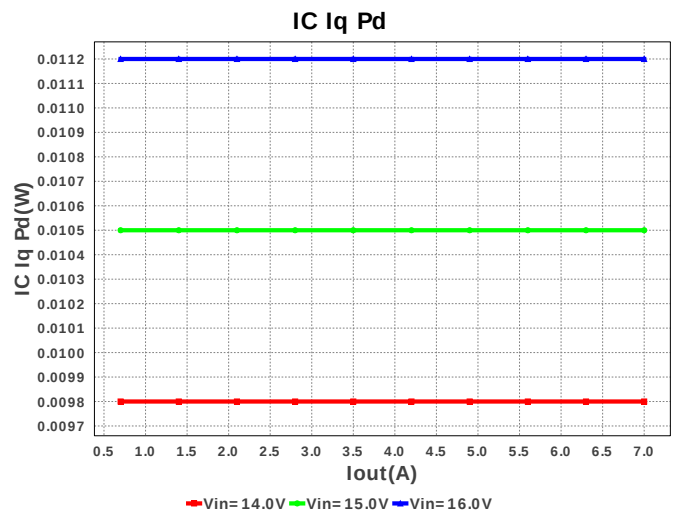
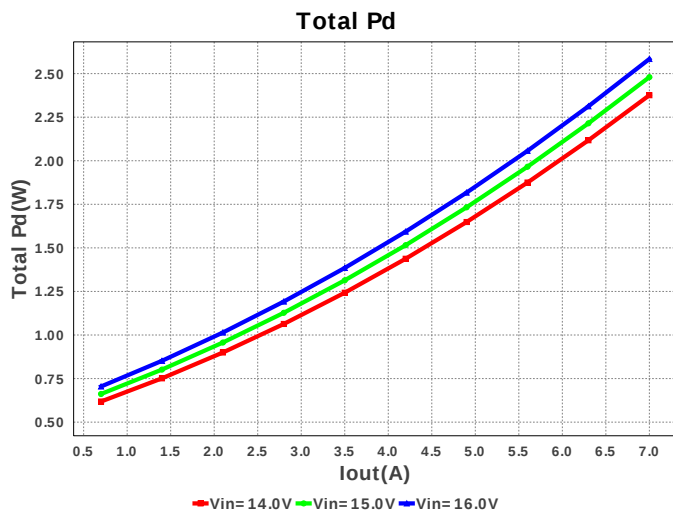
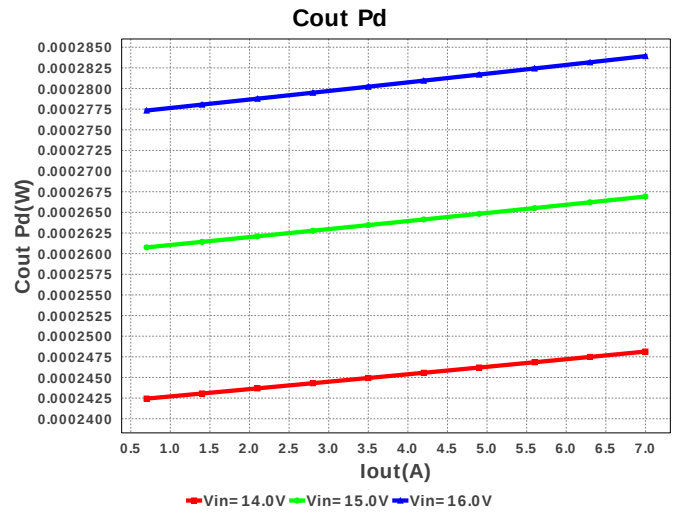
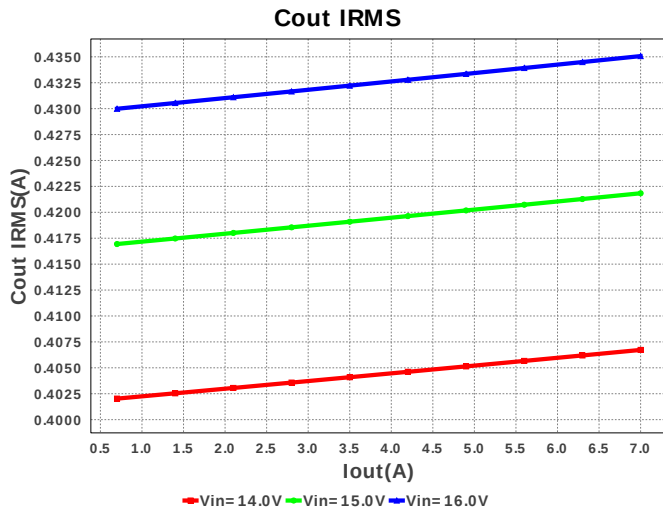
Electrical BOM

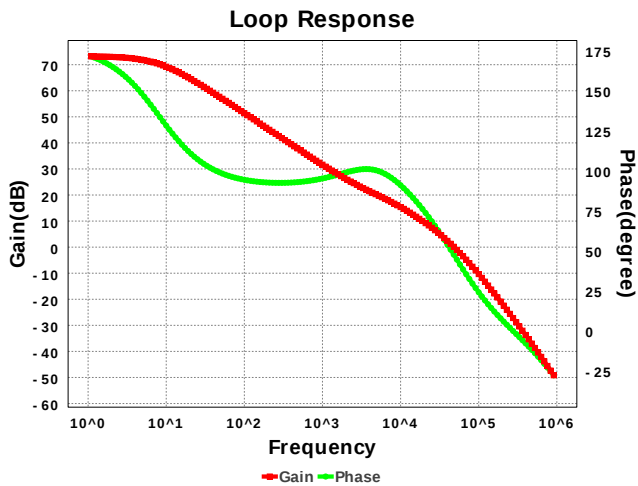
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	TDK	C1005X5R1A104K Series= X5R	Cap= 100.0 nF ESR= 18.6 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3mm2
2.	Ccomp	MuRata	GRM155R71C822KA01D Series= X7R	Cap= 8.2 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0402 3mm2
3.	Ccomp2	Kemet	C0603C180J5GACTU Series= C0G/NP0	Cap= 18.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5mm2
4.	Cin	TDK	C3225X5R1E106K Series= X5R	Cap= 10.0 µF ESR= 15.0 mOhm VDC= 25.0 V IRMS= 3.0 A	1	\$0.15	1210 15mm2
5.	Cout	TDK	C5750X5R1A686M Series= X5R	Cap= 68.0 µF ESR= 1.5 mOhm VDC= 10.0 V IRMS= 4.1 A	1	\$1.05	2220 60mm2
6.	Css	MuRata	GRM033R61A222KA01D Series= X5R	Cap= 2.2 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0201 2mm2
7.	L1	Coilcraft	XAL1010-332MEB	L= 3.3 µH DCR= 3.7 mOhm	1	\$1.08	XAL1010 160mm2
8.	Rcomp	Vishay-Dale	CRCW04025K36FKED Series= CRCW..e3	Res= 5.36 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2
9.	RenB	Vishay-Dale	CRCW04021K74FKED Series= CRCW..e3	Res= 1.74 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2
10.	RenT	Vishay-Dale	CRCW04024K64FKED Series= CRCW..e3	Res= 4.64 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfbb	Vishay-Dale	CRCW04021K37FKED Series= CRCW..e3	Res= 1.37 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
12.	Rfbt	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
13.	Rilim	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11mm2
14.	Rt	Yageo America	RT0805BRD0770K6L Series= 254	Res= 70.6 kOhm Power= 125.0 mW Tolerance= 0.1%	1	NA	 0805 7mm2
15.	U1	Texas Instruments	TPS54020RUWR	Switcher	1	\$3.45	R-PVQFN-N15 21mm2









Operating Values

#	Name	Value	Category	Description
1.	BOM Count	15		Total Design BOM count
2.	Total BOM	\$0.0		Total BOM Cost
3.	Cin IRMS	3.257 A	Current	Input capacitor RMS ripple current
4.	Cout IRMS	435.069 mA	Current	Output capacitor RMS ripple current
5.	IC Ipk	7.754 A	Current	Peak switch current in IC
6.	Iin Avg	2.349 A	Current	Average input current
7.	L Ipp	1.507 A	Current	Peak-to-peak inductor ripple current
8.	FootPrint	311.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	701.173 kHz	General	Switching frequency
10.	Pout	35.0 W	General	Total output power
11.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
12.	Cross Freq	48.459 kHz	Op_point	Bode plot crossover frequency
13.	Duty Cycle	31.703 %	Op_point	Duty cycle
14.	Efficiency	93.125 %	Op_point	Steady state efficiency
15.	IC Tj	66.482 degC	Op_point	IC junction temperature
16.	ICThetaJA	16.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	7.0 A	Op_point	Iout operating point
18.	Phase Marg	48.061 deg	Op_point	Bode Plot Phase Margin
19.	VIN_OP	16.0 V	Op_point	Vin operating point
20.	Vout p-p	5.186 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	159.143 mW	Power	Input capacitor power dissipation
22.	Cout Pd	283.927 μW	Power	Output capacitor power dissipation
23.	IC Iq Pd	11.2 mW	Power	IC Iq Pd
24.	IC Pd	2.198 W	Power	IC power dissipation
25.	L Pd	226.625 mW	Power	Inductor power dissipation
26.	Total Pd	2.584 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	7.0 A	Maximum Output Current
2.	Iout1	7.0 Amps	Output Current #1
3.	SoftStart	0.5 ms	Soft Start Time (ms)
4.	VinMax	16.0 V	Maximum input voltage
5.	VinMin	14.0 V	Minimum input voltage
6.	Vout	5.0 V	Output Voltage
7.	Vout1	5.0 Volt	Output Voltage #1
8.	base_pn	TPS54020	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	30.0 degC	Ambient temperature
11.	UserFsw	700.0 kHz	Customer Selected Frequency

Design Assistance

1. **TPS54020** Product Folder : <http://www.ti.com/product/tps54020> : contains the data sheet and other resources.

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