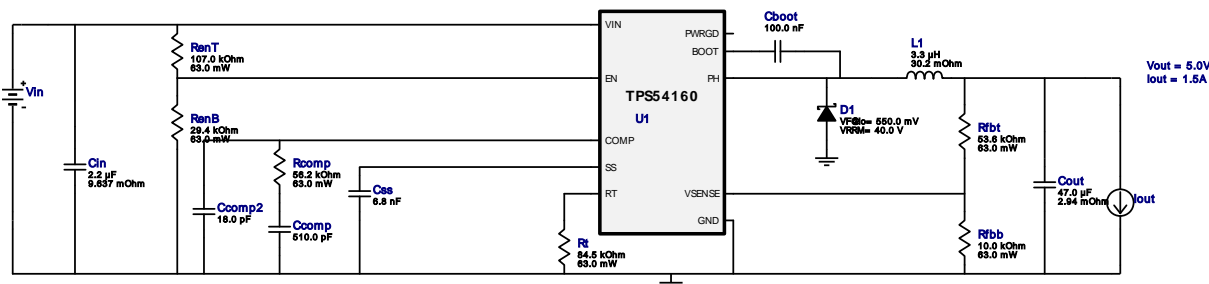





## WEBENCH® Design Report

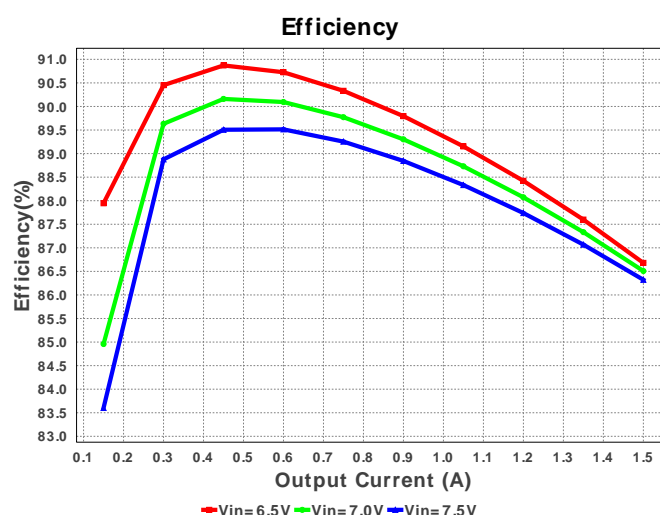
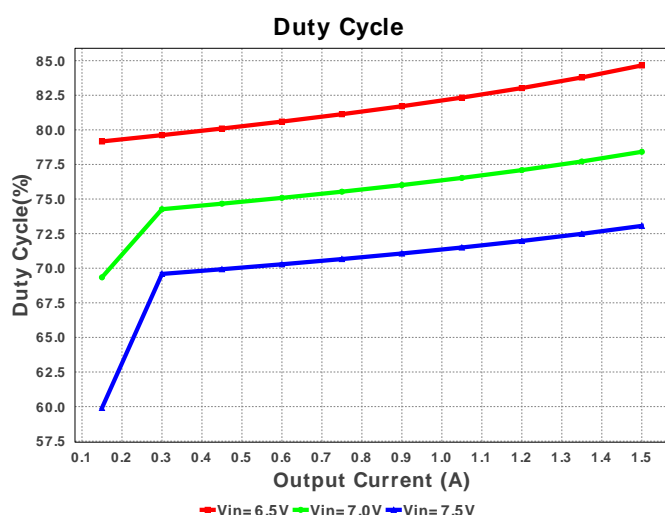
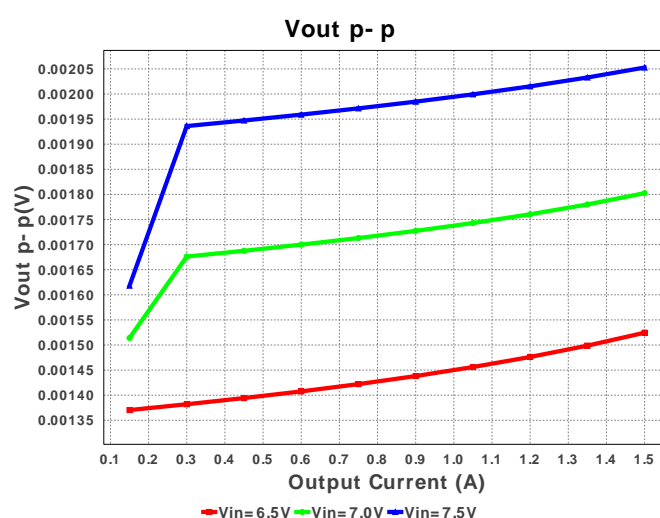
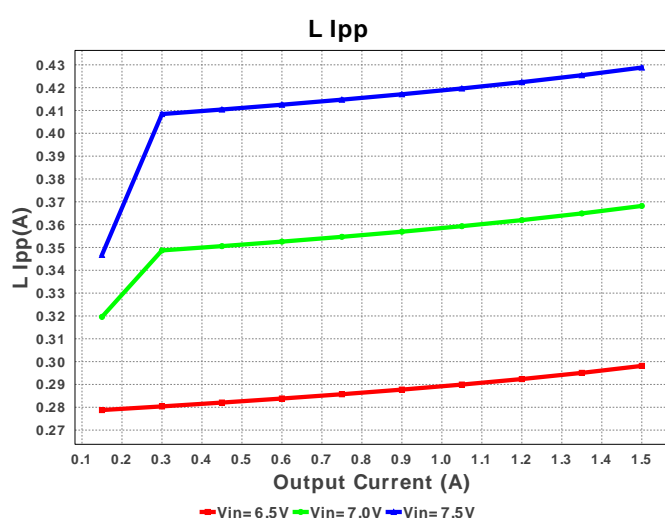
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TPS54160DGQR 6.5V-7.5V to 5.00V @ 1.5A

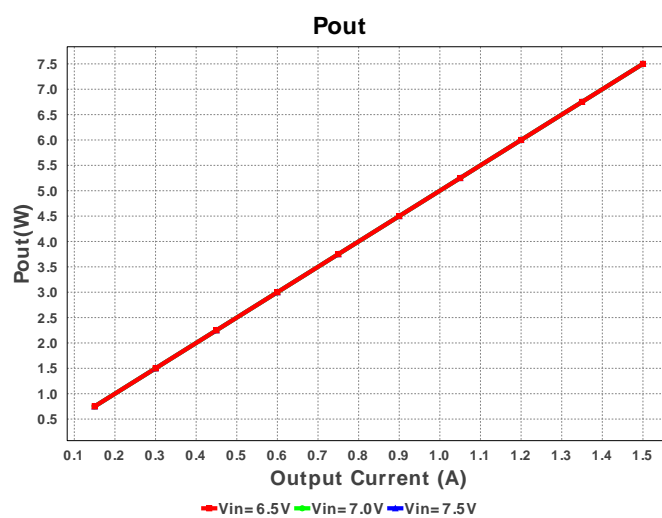
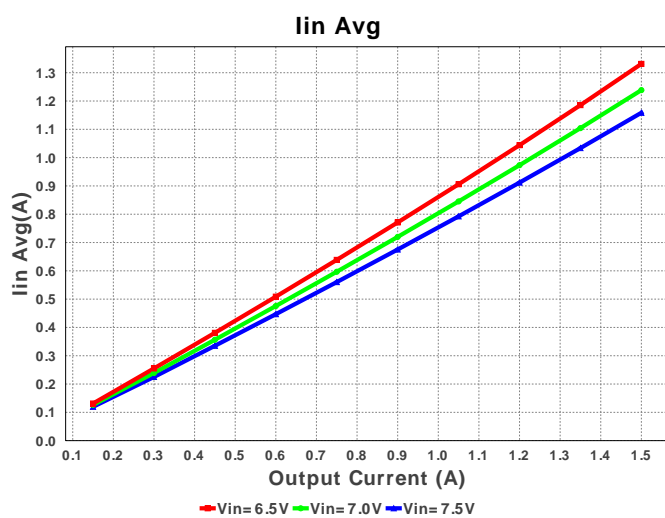
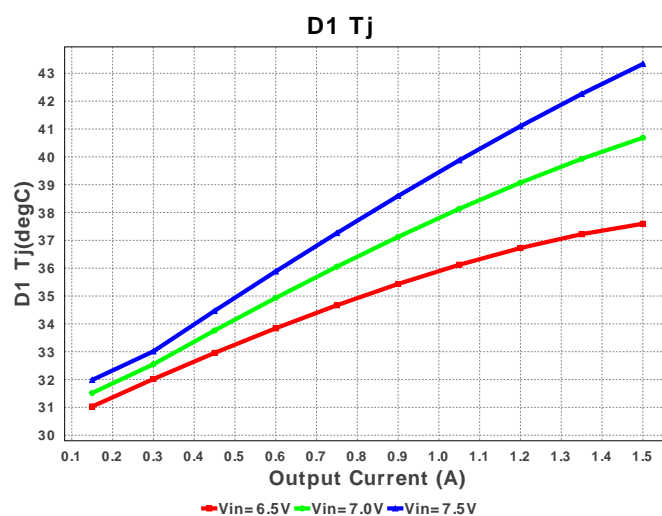
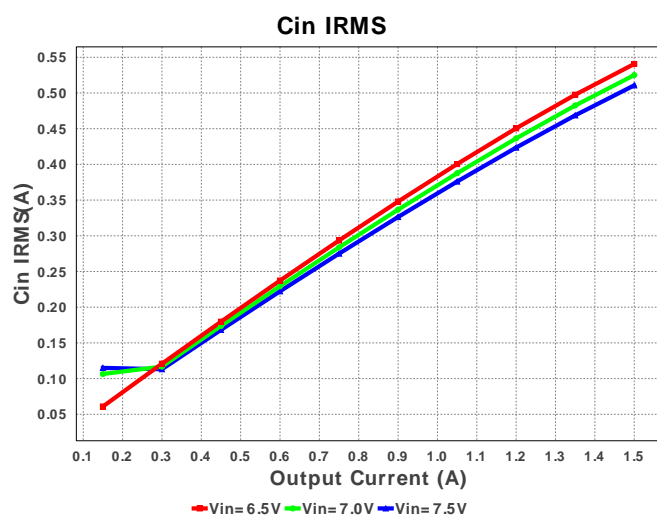
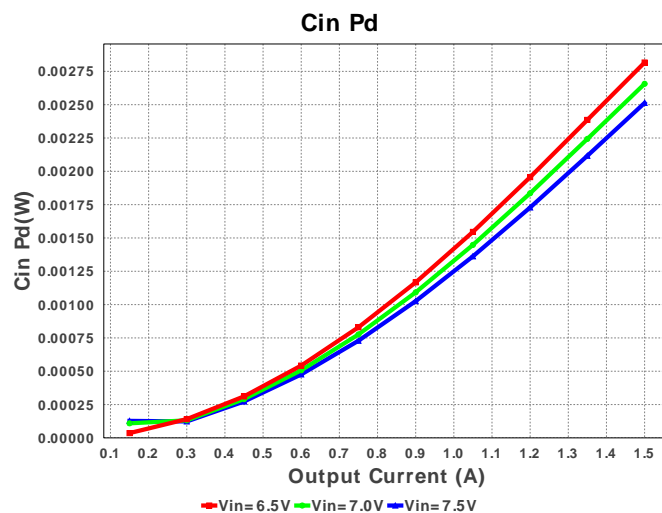
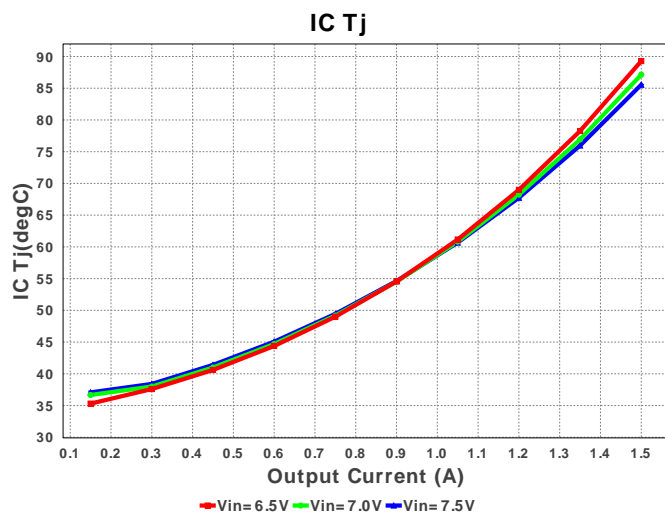


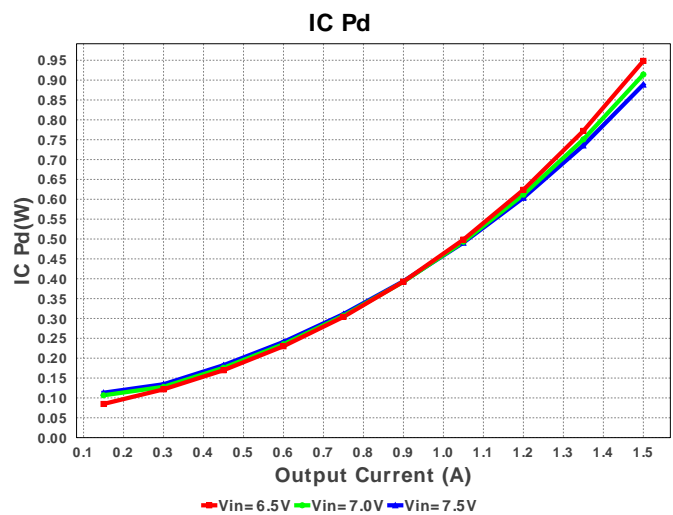
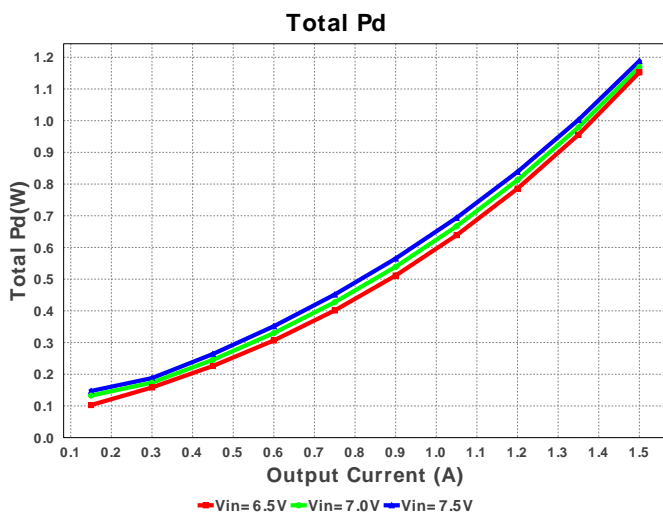
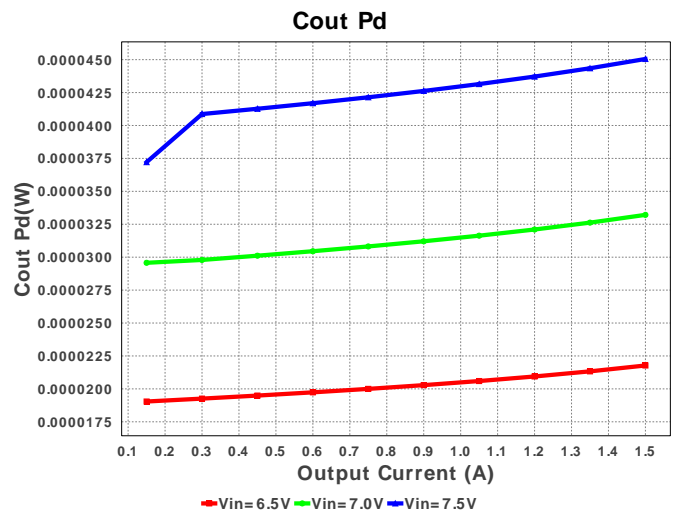
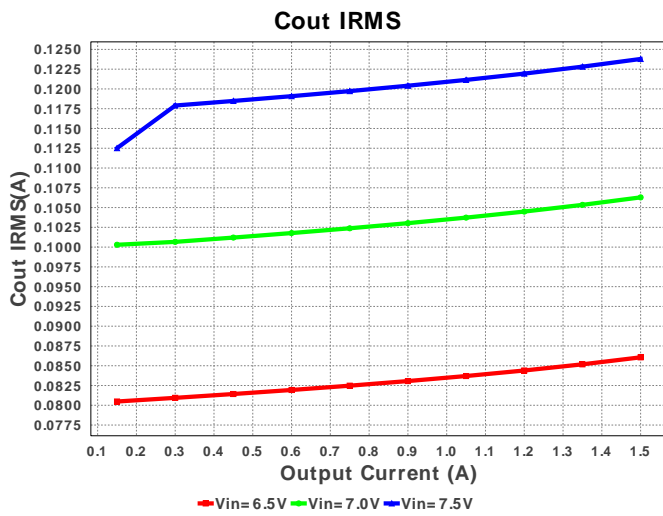
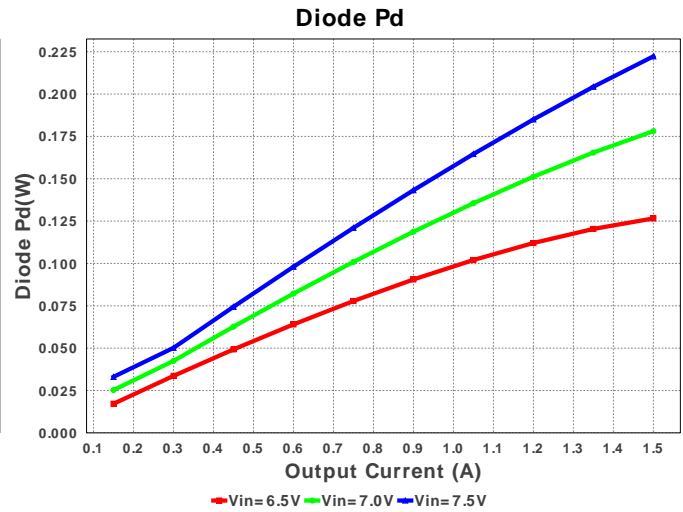
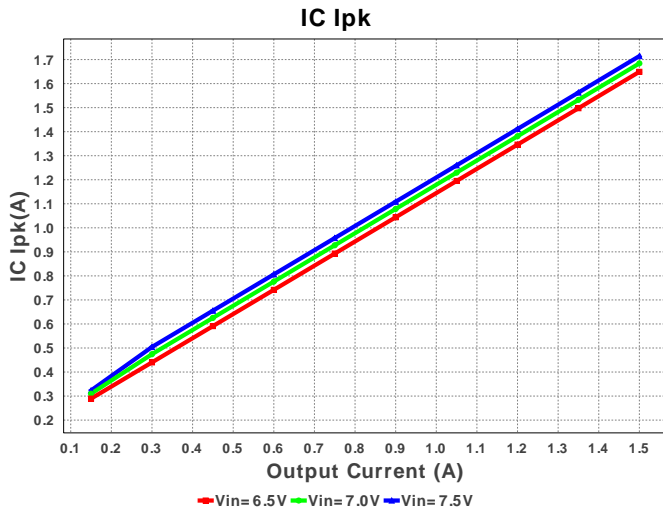
## Electrical BOM

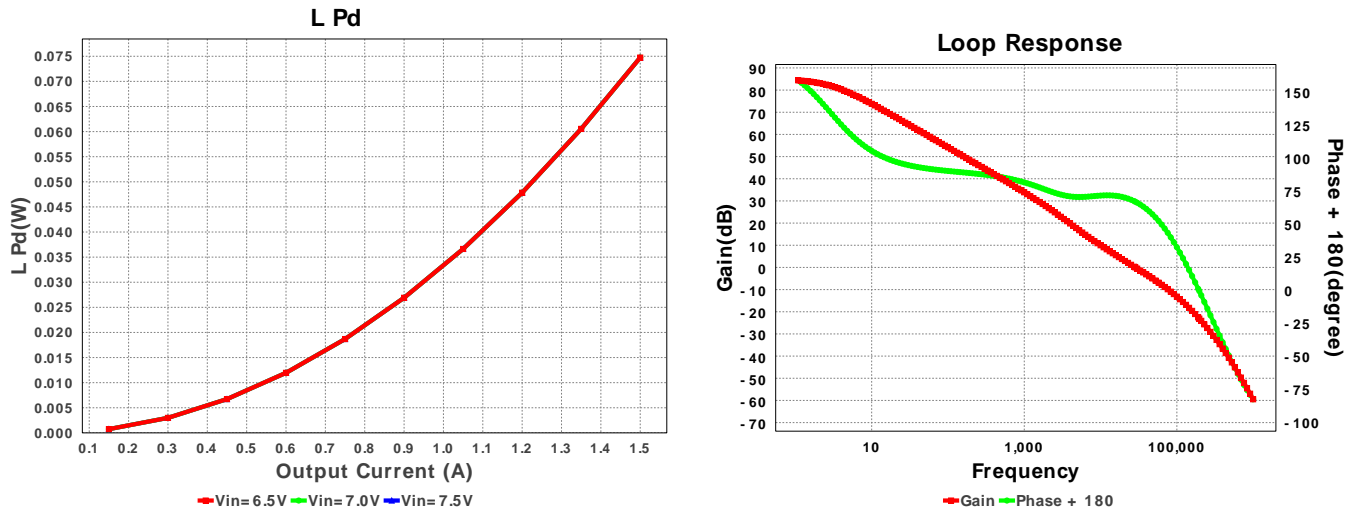
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
2.	Ccomp	Samsung Electro-Mechanics	CL21C511JBANNNC Series= C0G/NP0	Cap= 510.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm <sup>2</sup>
3.	Ccomp2	Kemet	C0805C180K5GACTU Series= C0G/NP0	Cap= 18.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
4.	Cin	MuRata	GRM188R61A225KE34D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 10.0 V IRMS= 1.24283 A	1	\$0.02	0603 5 mm <sup>2</sup>
5.	Cout	TDK	C2012X5R1A476M125AC Series= X5R	Cap= 47.0 uF ESR= 2.94 mOhm VDC= 10.0 V IRMS= 3.80451 A	1	\$0.29	0805 7 mm <sup>2</sup>
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 <sup>2</sup>
7.	D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.07	SOD-123F 12 mm <sup>2</sup>
8.	L1	Bourns	SRN6045-3R3Y	L= 3.3 uH DCR= 30.2 mOhm	1	\$0.17	SRN6045 64 mm <sup>2</sup>
9.	Rcomp	Vishay-Dale	CRCW040256K2FKED Series= CRCW..e3	Res= 56.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
10.	RenB	Vishay-Dale	CRCW040229K4FKED Series= CRCW..e3	Res= 29.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
11.	RenT	Vishay-Dale	CRCW0402107KFKED Series= CRCW..e3	Res= 107.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
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 <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	Rfbt	Vishay-Dale	CRCW040253K6FKED Series= CRCW..e3	Res= 53.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
14.	Rt	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
15.	U1	Texas Instruments	TPS54160DGQR	Switcher	1	\$1.35	 S-PDSO-G10 24 mm <sup>2</sup>









## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	510.681 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	123.787 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.714 A	Current	Peak switch current in IC
4.	Iin Avg	1.158 A	Current	Average input current
5.	L Ipp	428.81 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	15	General	Total Design BOM count
7.	FootPrint	152.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
8.	Frequency	1.291 MHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	7.5 W	General	Total output power
11.	Total BOM	\$2.02	General	Total BOM Cost
12.	D1 Tj	43.335 degC	Op_Point	D1 junction temperature
13.	Low Freq Gain	84.353 dB	Op_Point	Gain at 1Hz
14.	Vout Actual	5.088 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	28.584 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	73.06 %	Op_point	Duty cycle
18.	Efficiency	86.322 %	Op_point	Steady state efficiency
19.	Gain Marg	-23.09 dB	Op_point	Bode Plot Gain Margin
20.	IC Tj	85.553 degC	Op_point	IC junction temperature
21.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.5 A	Op_point	Iout operating point
23.	Phase Marg	67.547 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	7.5 V	Op_point	Vin operating point
25.	Vout p-p	2.053 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	2.513 mW	Power	Input capacitor power dissipation
27.	Cout Pd	45.05 μW	Power	Output capacitor power dissipation
28.	Diode Pd	222.258 mW	Power	Diode power dissipation
29.	IC Pd	888.855 mW	Power	IC power dissipation
30.	L Pd	74.745 mW	Power	Inductor power dissipation
31.	Total Pd	1.188 W	Power	Total Power Dissipation
32.	Vout Tolerance	2.72 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

## Design Inputs

#	Name	Value	Description
1.	Iout	1.5	Maximum Output Current
2.	VinMax	7.5	Maximum input voltage
3.	VinMin	6.5	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54160	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

## Design Assistance

1. **TPS54160** Product Folder : <http://www.ti.com/product/TPS54160> : contains the data sheet and other resources.

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