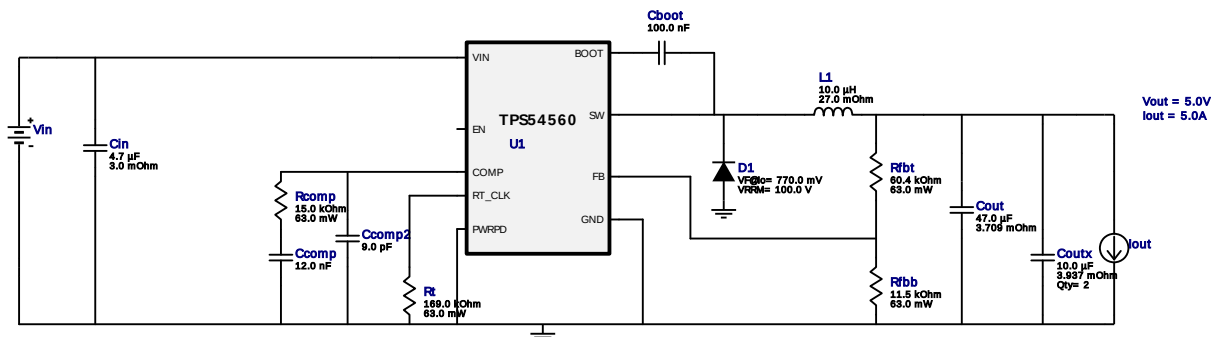


WEBENCH® Design Report

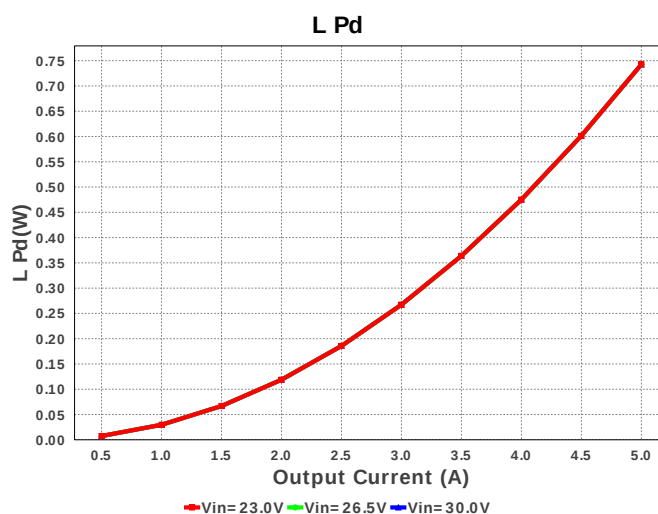
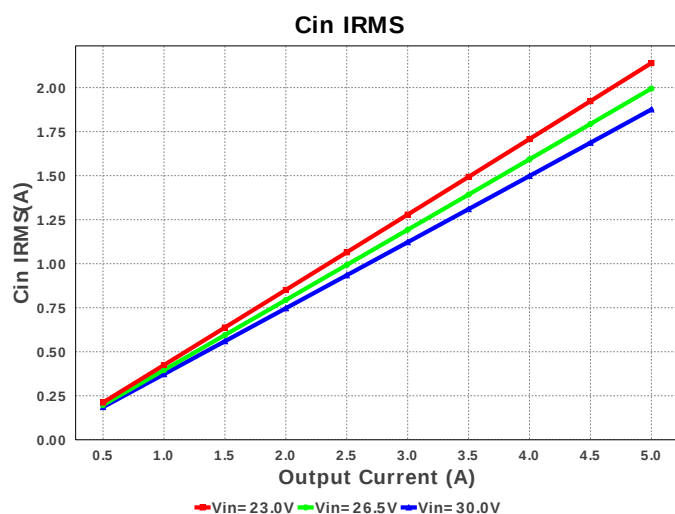
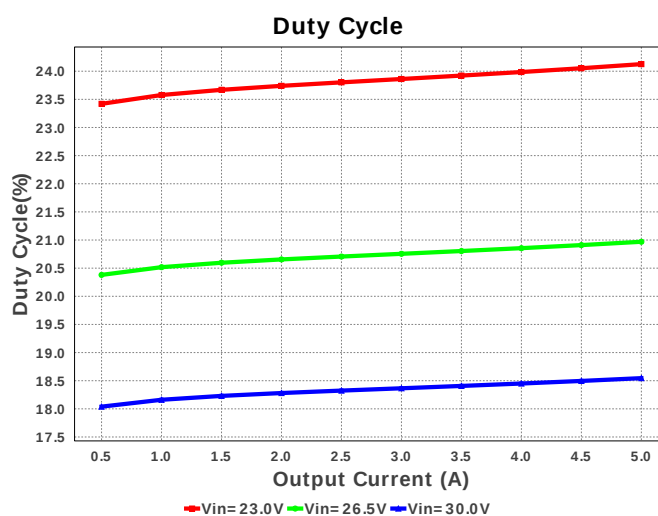
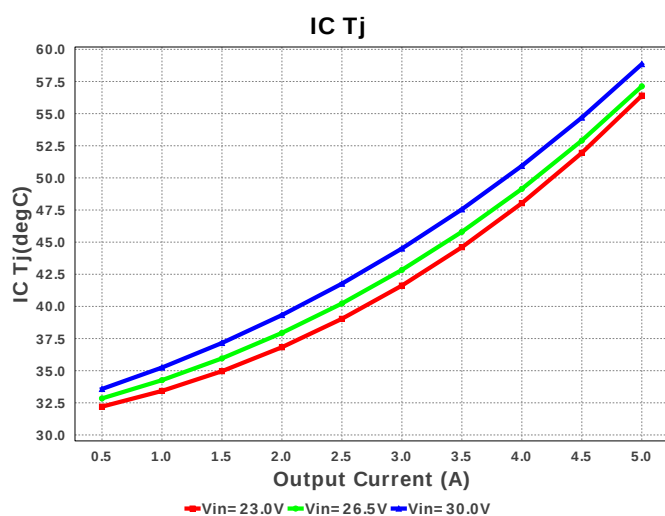
Design : 4766773/8 TPS54560DDAR
TPS54560DDAR 23.0V-30.0V to 5.00V @ 5.0A



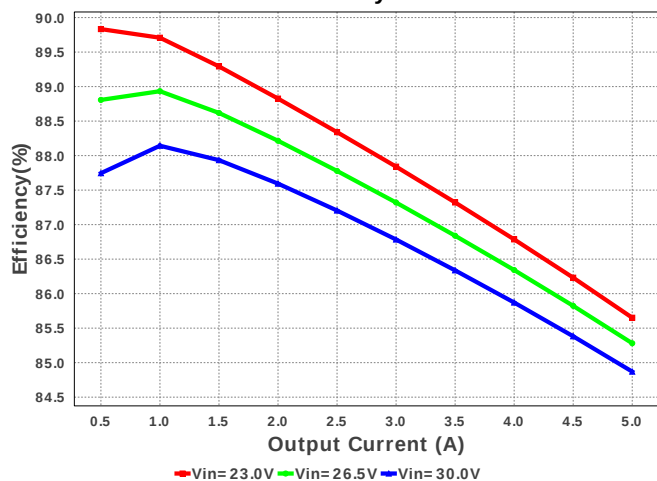
Electrical BOM

#	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	GRM033C80J123KE01D Series= X6S	Cap= 12.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	 0201 2 mm ²
3.	Ccomp2	MuRata	GQM2195C2A9R0CB01D Series= C0G/NP0	Cap= 9.0 pF VDC= 100.0 V IRMS= 0.0 A	1	\$0.17	 0805 7 mm ²
4.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.07	 1206 11 mm ²
5.	Cout	MuRata	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	1	\$0.15	 1206_190 11 mm ²
6.	Coutx	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	2	\$0.03	 0805 7 mm ²
7.	D1	Vishay-Semiconductor	50WQ10FNPBF	VF@Io= 770.0 mV VRRM= 100.0 V	1	\$0.74	 DPAK 102 mm ²
8.	L1	Coilcraft	XAL6060-103MEB	L= 10.0 uH DCR= 27.0 mOhm	1	\$0.82	 XAL6060 72 mm ²
9.	Rcomp	Vishay-Dale	CRCW040215K0FKED Series= CRCW..e3	Res= 15.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rfbb	Vishay-Dale	CRCW040211K5FKED Series= CRCW..e3	Res= 11.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rfbt	Vishay-Dale	CRCW040260K4FKED Series= CRCW..e3	Res= 60.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

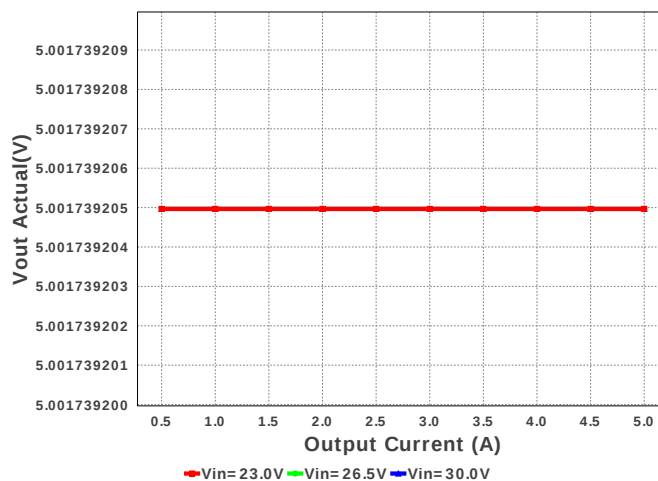
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rt	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
13.	U1	Texas Instruments	TPS54560DDAR	Switcher	1	\$2.30	 R-PDSO-G8 55 mm ²



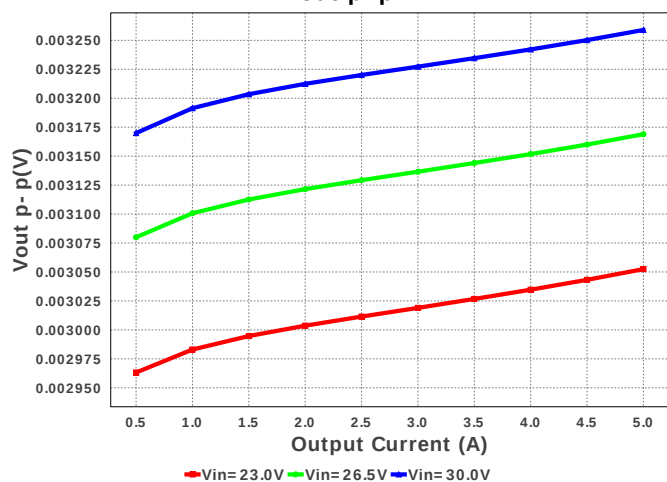
Efficiency



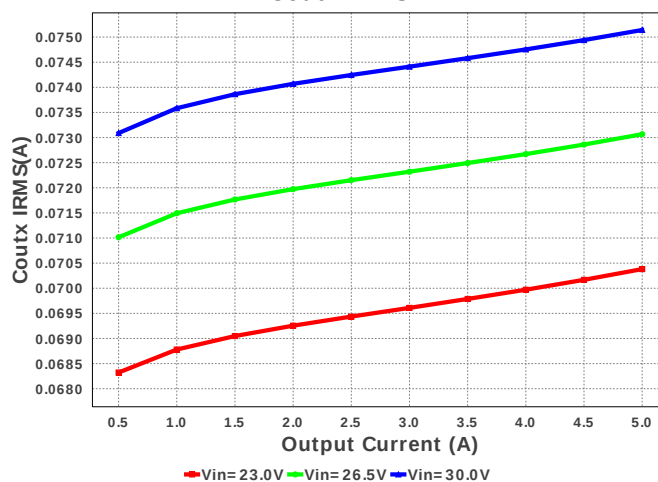
Vout Actual



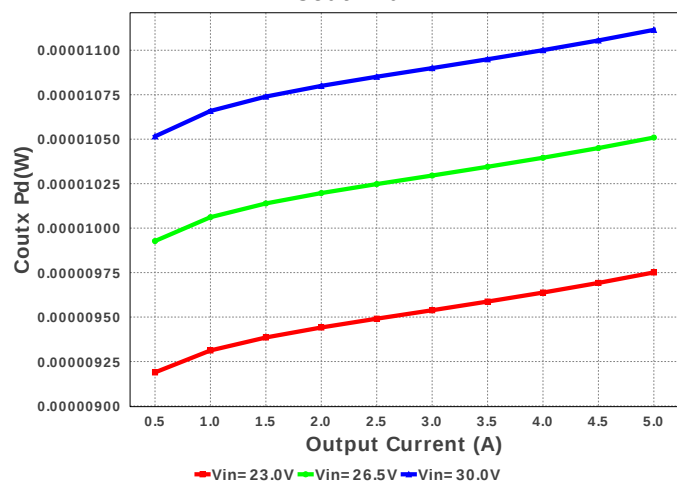
Vout p- p



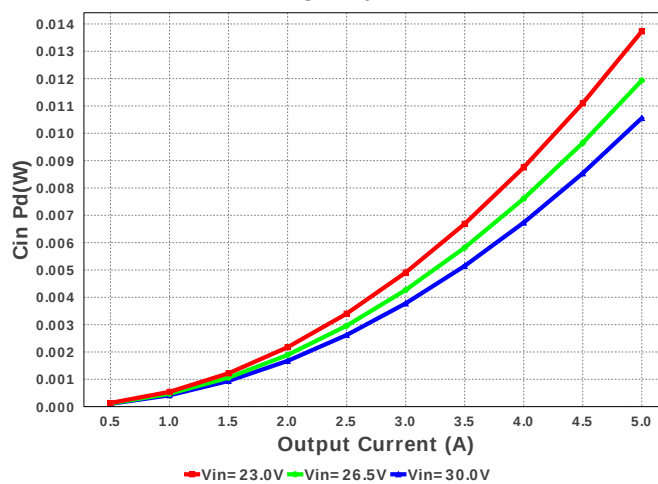
Coutx IRMS

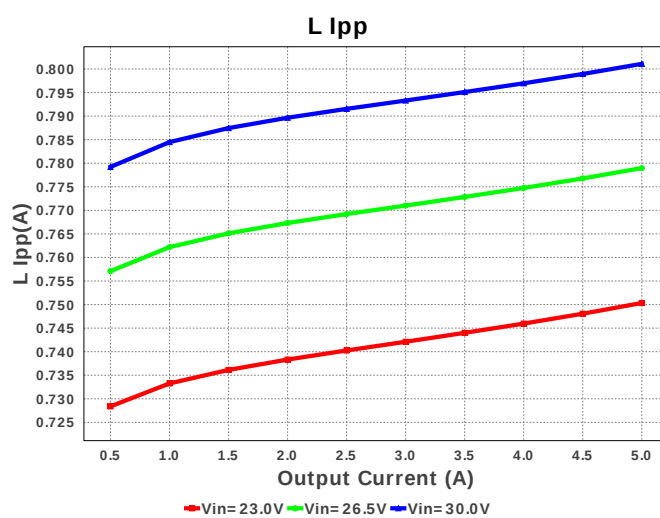
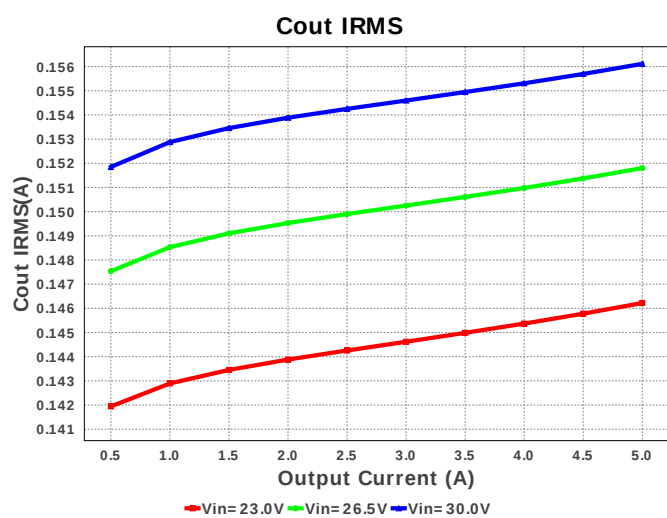
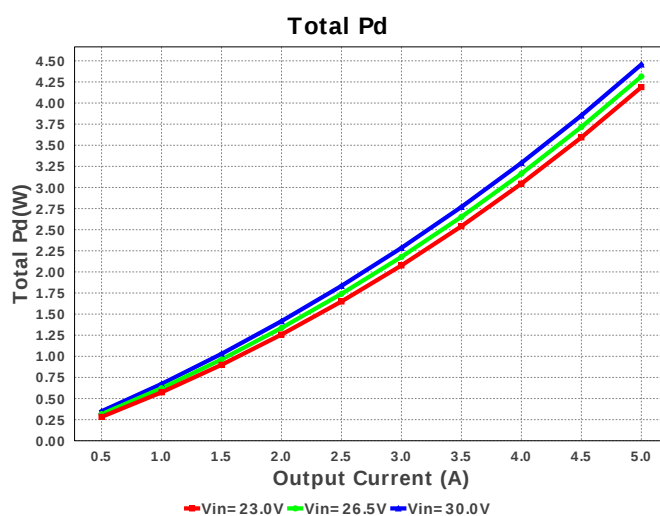
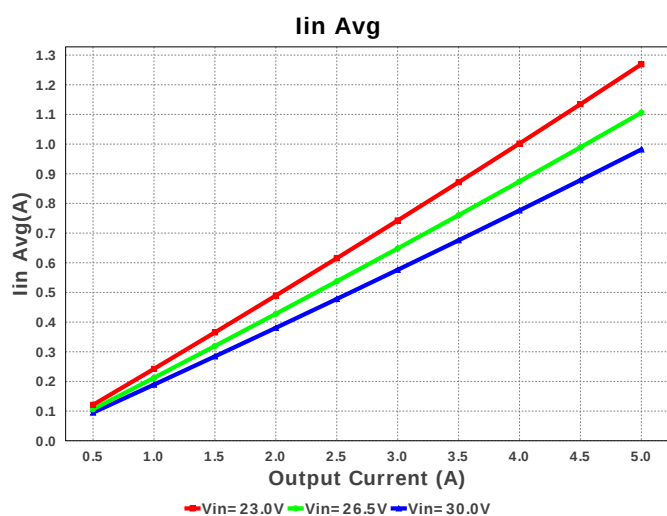
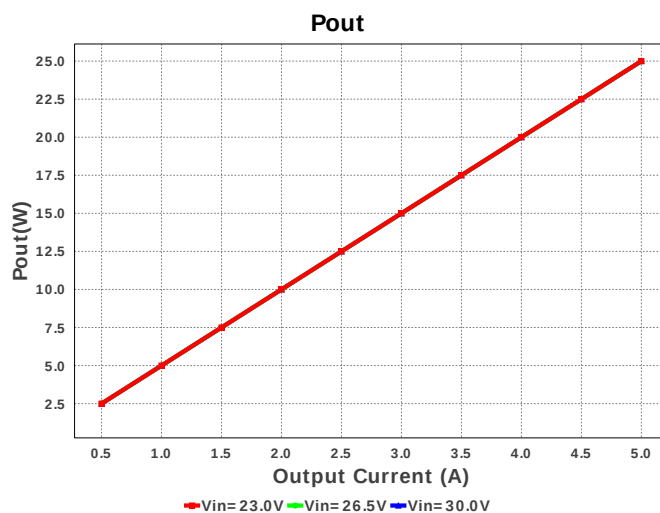
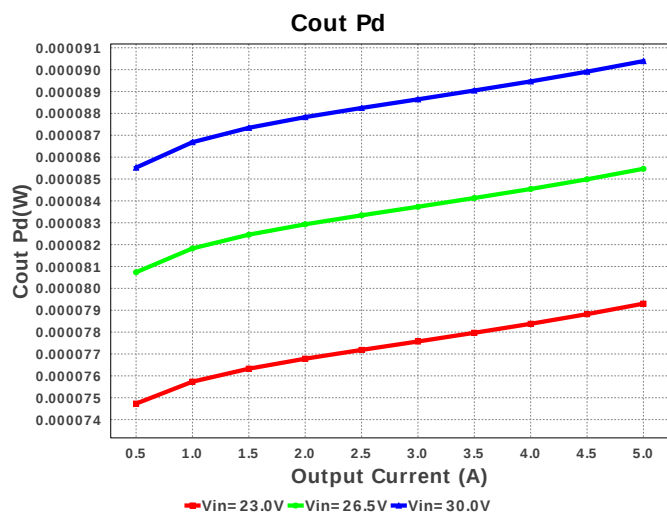


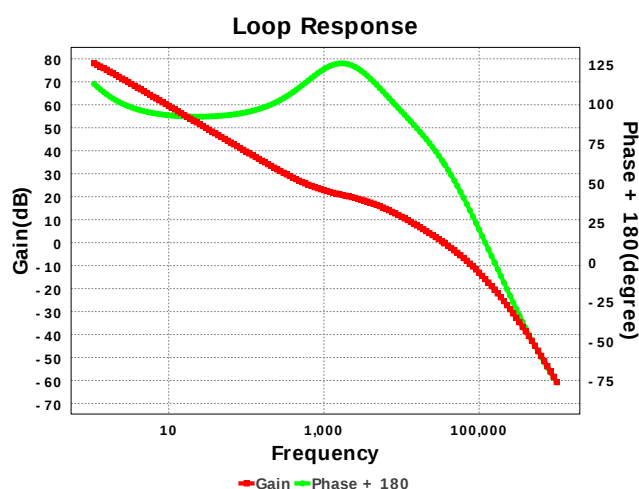
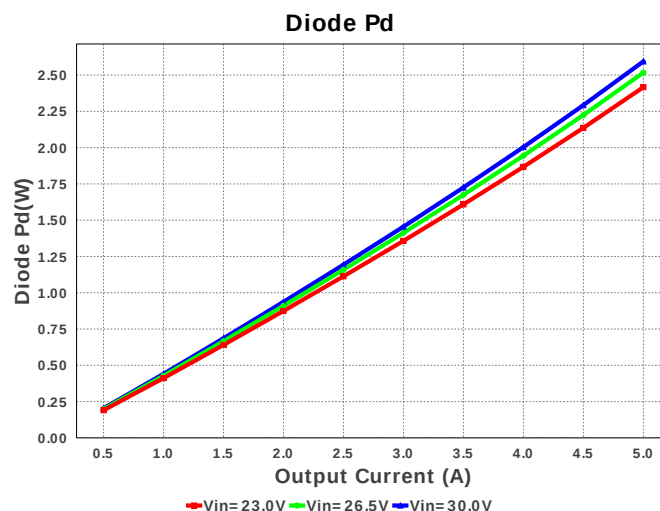
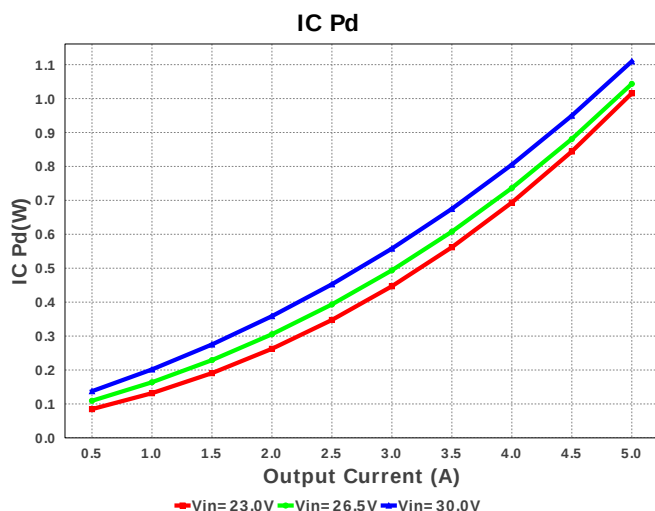
Coutx Pd



Cin Pd







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.876 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	156.111 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	75.141 mA	Current	Output capacitor_x RMS ripple current
4.	Iin Avg	981.9 mA	Current	Average input current
5.	L Ipp	801.08 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	14	General	Total Design BOM count
7.	FootPrint	288.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	578.765 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	25.0 W	General	Total output power
11.	Total BOM	\$4.37	General	Total BOM Cost
12.	ICThetaJA Effective	26.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
13.	Low Freq Gain	78.037 dB	Op_Point	Gain at 10Hz
14.	Vout Actual	5.002 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	35.09 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	18.546 %	Op_point	Duty cycle
18.	Efficiency	84.87 %	Op_point	Steady state efficiency
19.	Gain Marg	-20.505 dB	Op_point	Bode Plot Gain Margin
20.	IC Tj	58.851 degC	Op_point	IC junction temperature
21.	IOUT_OP	5.0 A	Op_point	Iout operating point
22.	Phase Marg	62.843 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	30.0 V	Op_point	Vin operating point
24.	Vout p-p	3.259 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	10.558 mW	Power	Input capacitor power dissipation
26.	Cout Pd	90.391 μ W	Power	Output capacitor power dissipation
27.	Coutx Pd	11.115 μ W	Power	Output capacitor_x power loss
28.	Diode Pd	2.594 W	Power	Diode power dissipation
29.	IC Pd	1.11 W	Power	IC power dissipation
30.	L Pd	742.5 mW	Power	Inductor power dissipation
31.	Total Pd	4.457 W	Power	Total Power Dissipation

#	Name	Value	Category	Description
32.	Vout Tolerance	2.714 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	23.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54560	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54560** Product Folder : <http://www.ti.com/product/TPS54560> : contains the data sheet and other resources.

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