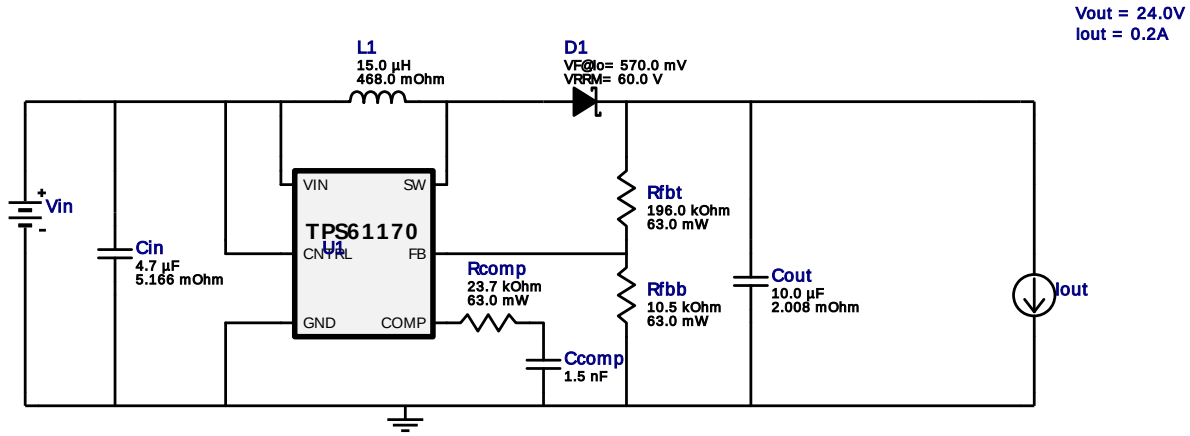
WEBENCH® Design Report

VinMin = 11.0V
VinMax = 13.0V
Vout = 24.0V
Iout = 0.2A

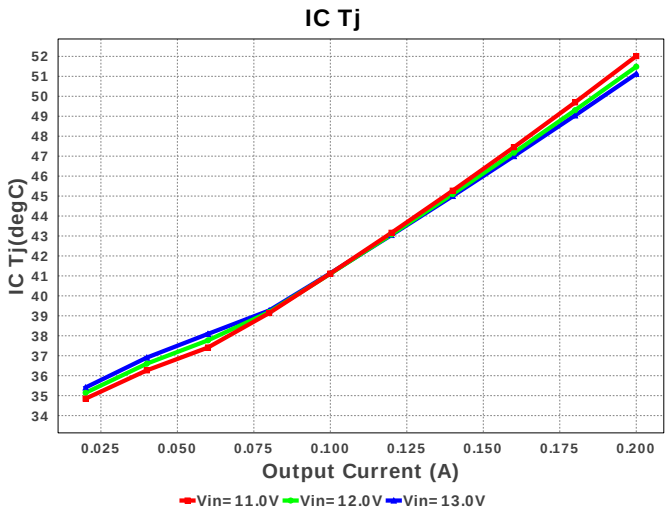
Device = TPS61170DRVR
Topology = Boost
Created = 7/15/16 8:31:16 PM
BOM Cost = $1.55
BOM Count = 9
Total Pd = 0.54W

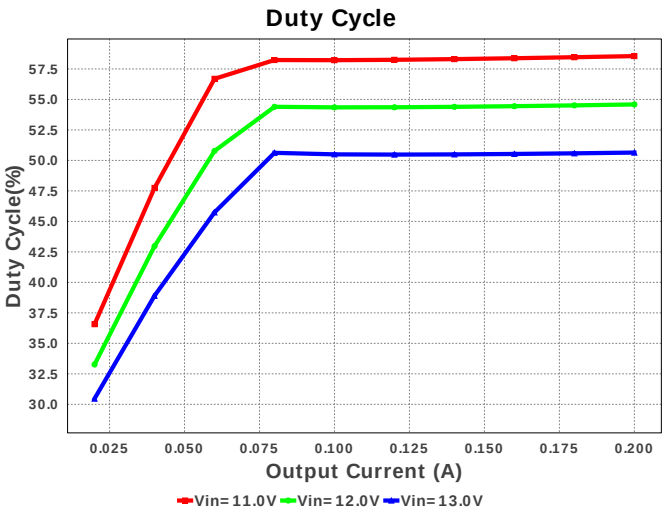
Design : 4742013/33 TPS61170DRVR
TPS61170DRVR 11.0V-13.0V to 24.00V @ 0.2A

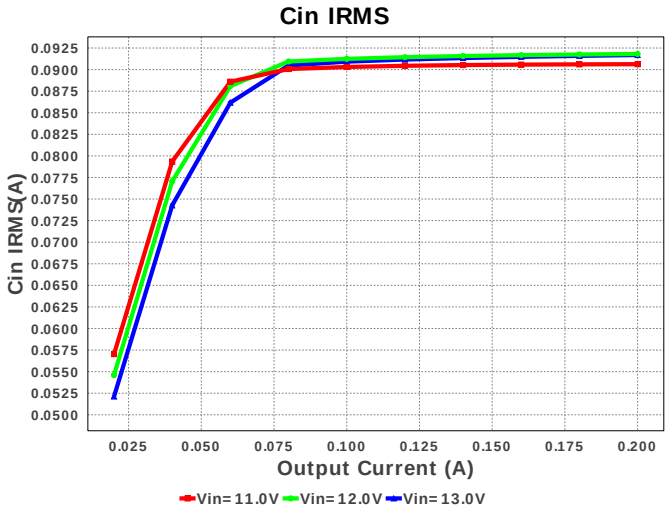


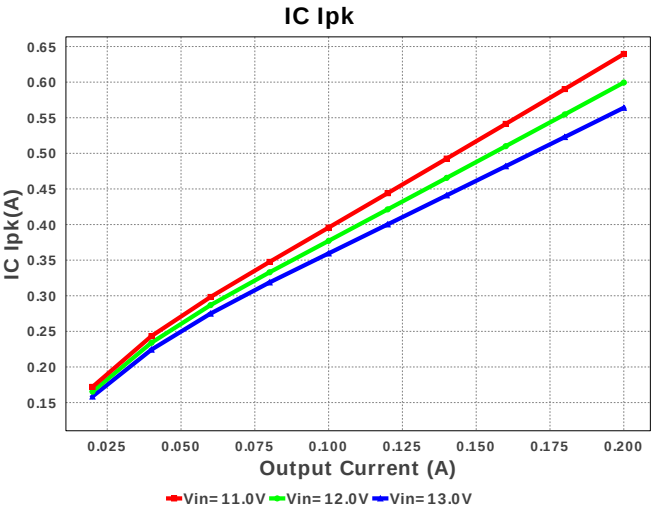
Electrical BOM

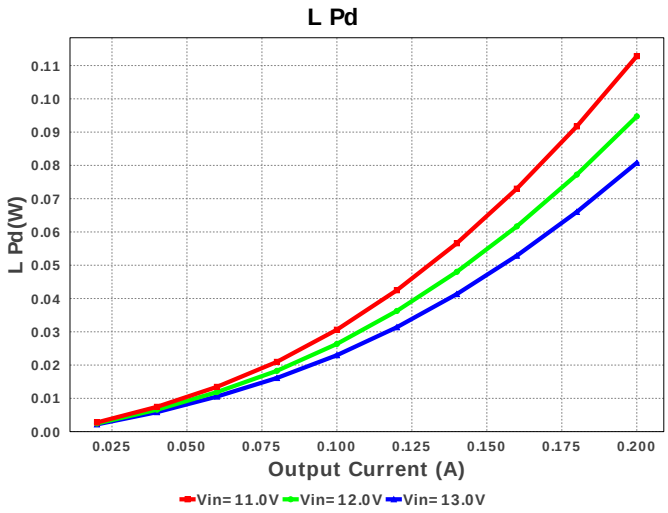
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	Yageo America	CC0805KRX7R9BB152 Series= X7R	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM21BC81E475KA12L Series= X6S	Cap= 4.7 uF ESR= 5.166 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.02	0805 7 mm²
3.	Cout	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	1	$0.22	1210_280 15 mm²
4.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
5.	L1	Coilcraft	ME3220-153KLB	L= 15.0 µH DCR= 468.0 mOhm	1	$0.23	ME3220 16 mm²
6.	Rcomp	Vishay-Dale	CRCW040223K7FKED Series= CRCW..e3	Res= 23.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	Rfbb	Vishay-Dale	CRCW040210K5FKED Series= CRCW..e3	Res= 10.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfbt	Vishay-Dale	CRCW0402196KFKED Series= CRCW..e3	Res= 196.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	U1	Texas Instruments	TPS61170DRVR	Switcher	1	$1.00	S-PWSON-N6 9 mm²

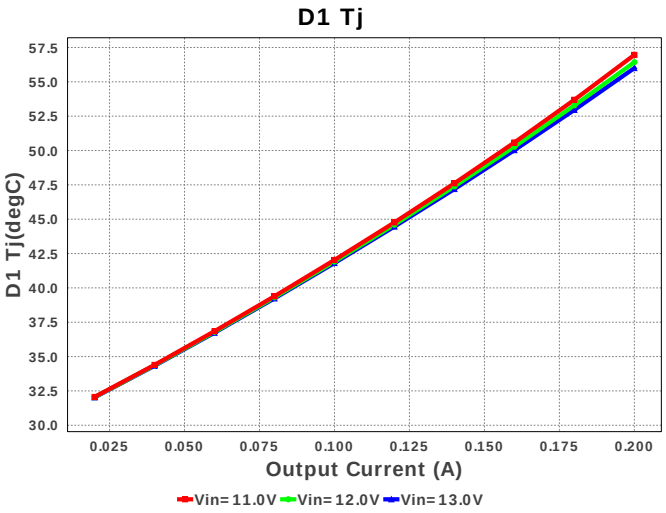


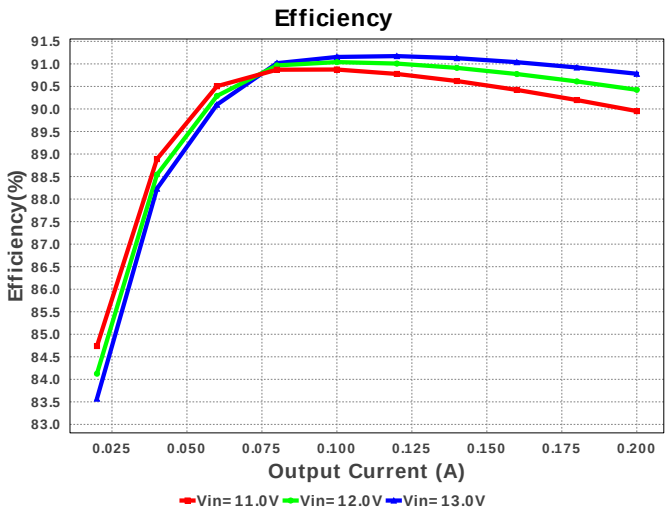


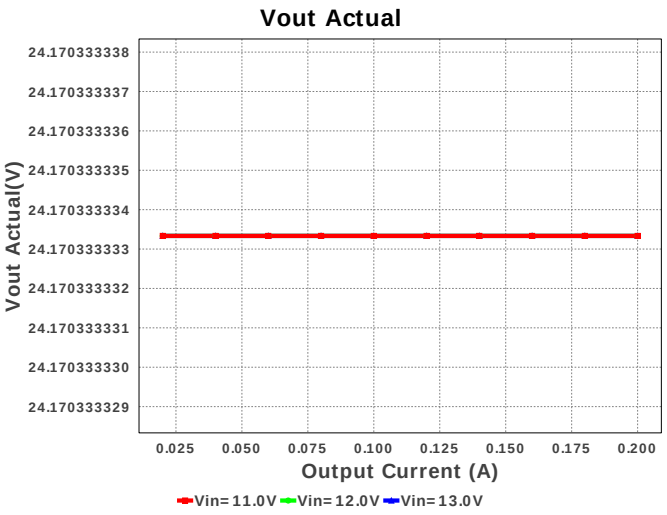


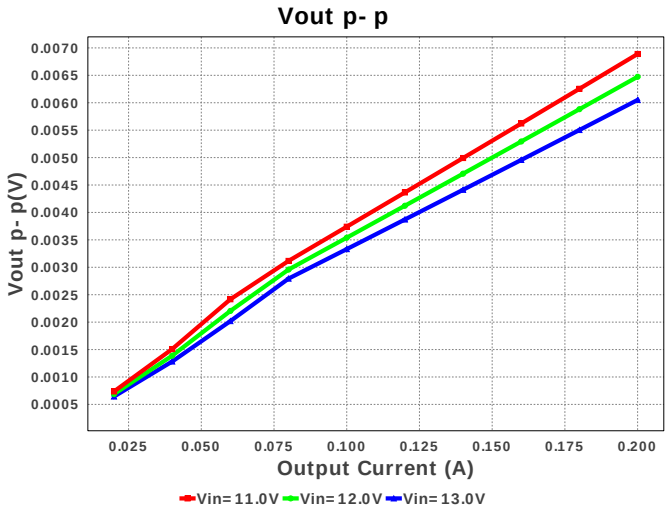


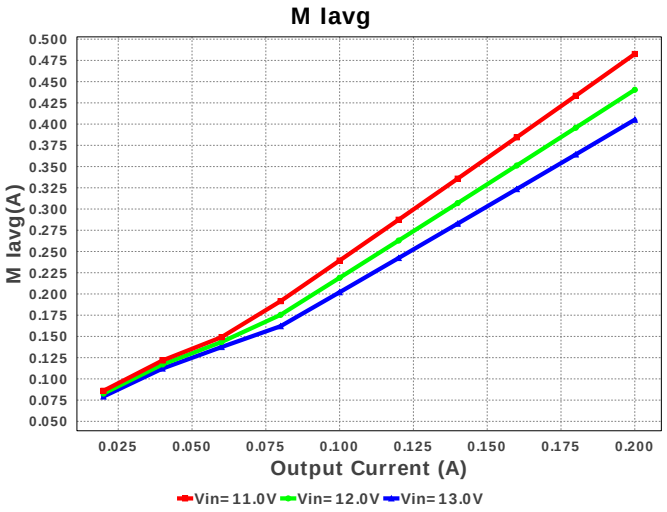


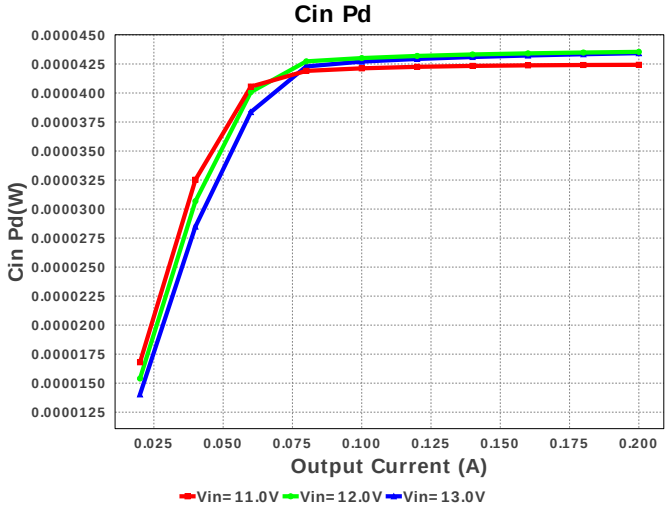


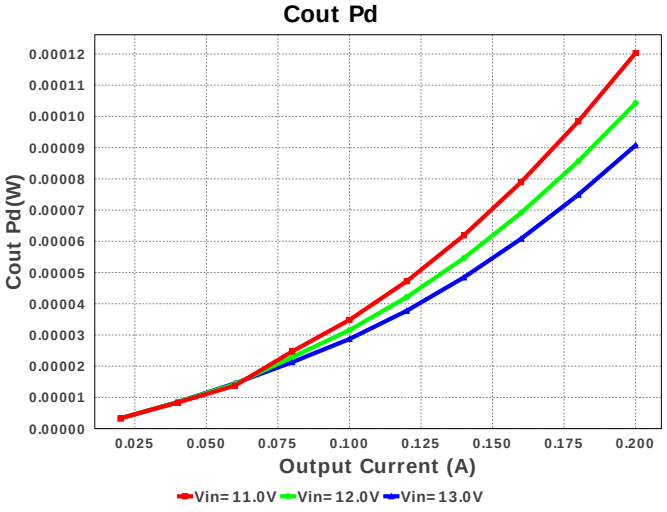


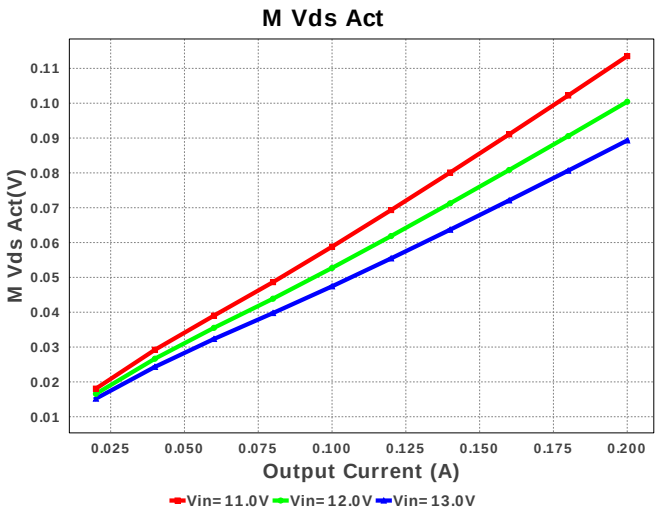


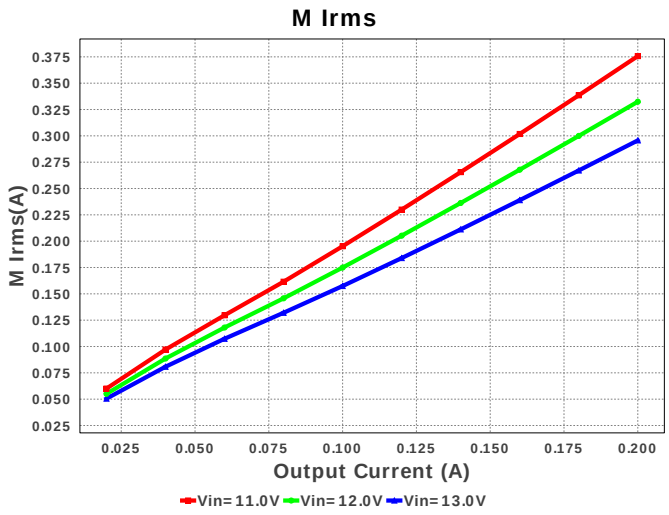


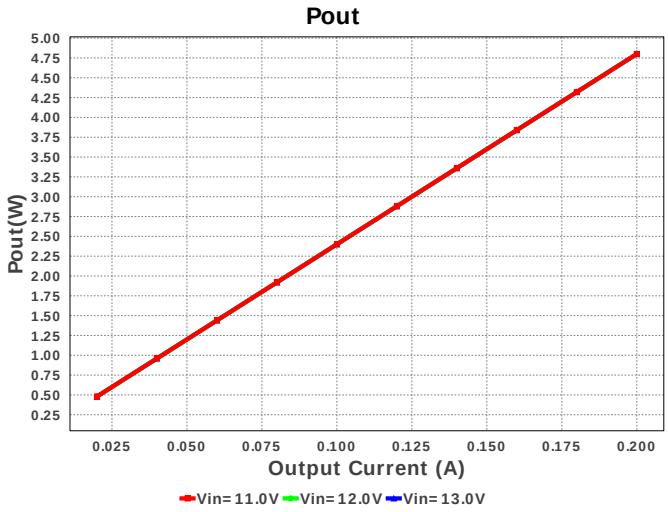


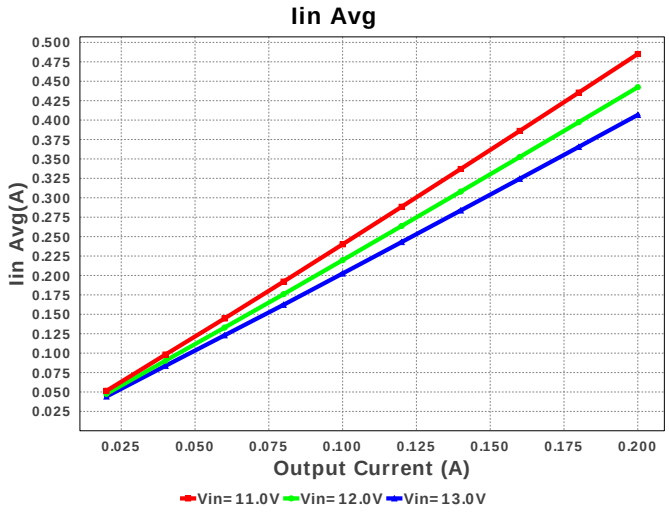


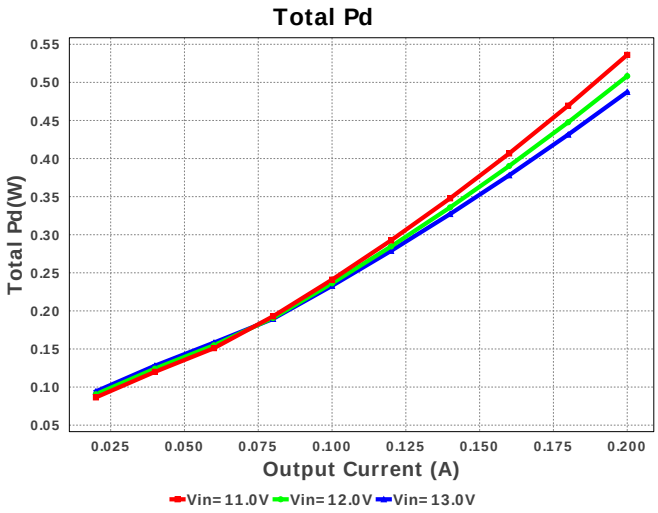


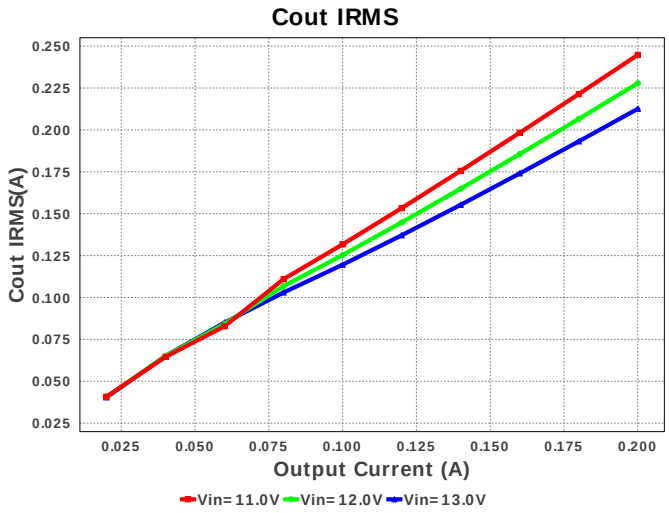


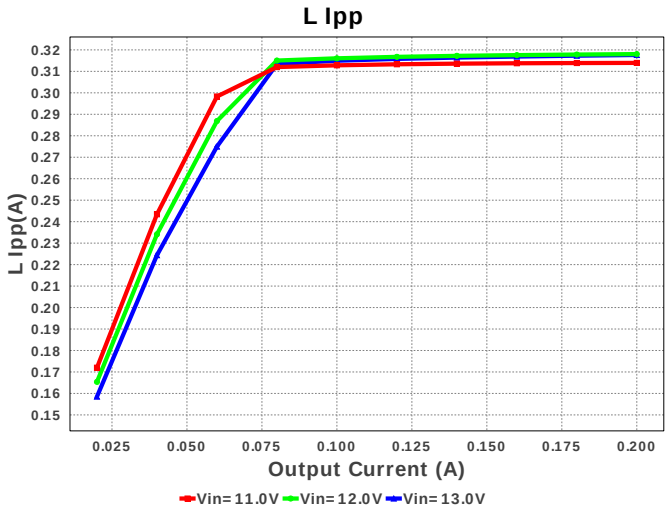


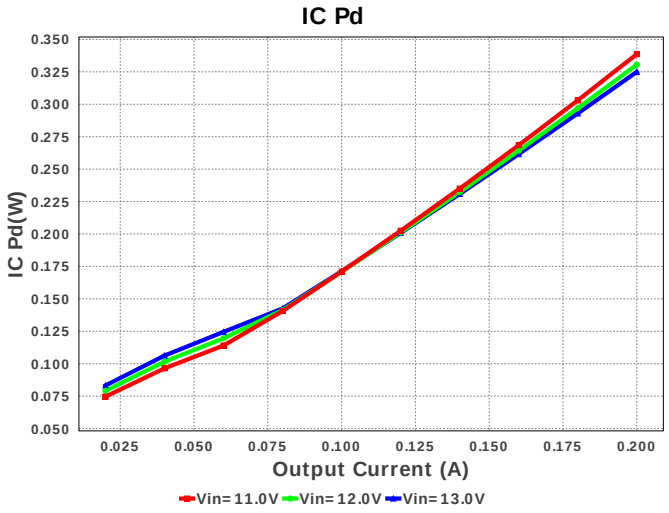


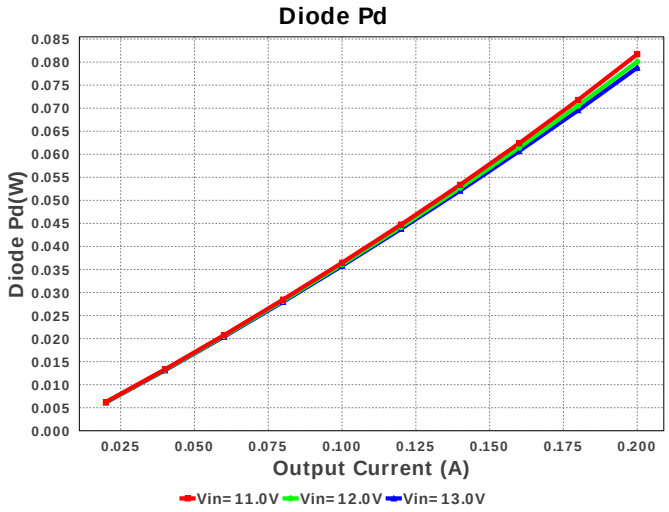


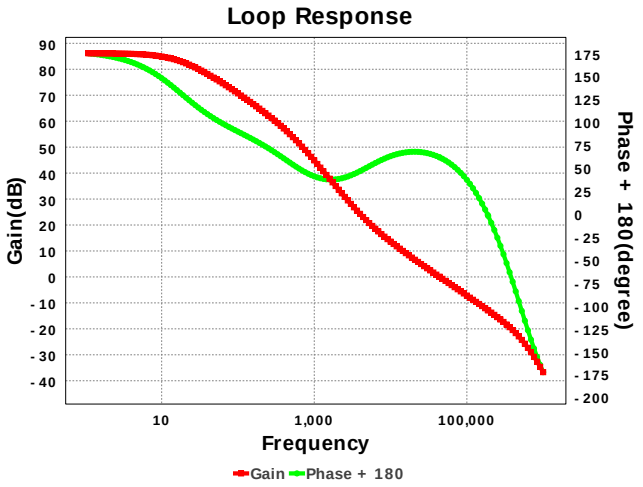












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	90.626 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	244.776 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	639.526 mA	Current	Peak switch current in IC
4.	Iin Avg	485.1 mA	Current	Average input current
5.	L Ipp	313.94 mA	Current	Peak-to-peak inductor ripple current
6.	M Iavg	482.558 mA	Current	MOSFET Average current
7.	M1 Irms	375.712 mA	Current	Q Iavg
8.	BOM Count	9	General	Total Design BOM count
9.	FootPrint	74.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	1.2 MHz	General	Switching frequency
11.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	113.526 mV	General	Voltage drop across the MosFET
13.	Pout	4.8 W	General	Total output power
14.	Total BOM	$1.55	General	Total BOM Cost
15.	D1 Tj	56.962 degC	Op_Point	D1 junction temperature
16.	Low Freq Gain	85.56 dB	Op_Point	Gain at 10Hz
17.	Vout Actual	24.17 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
18.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	29.158 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	58.554 %	Op_point	Duty cycle
21.	Efficiency	89.953 %	Op_point	Steady state efficiency
22.	Gain Marg	-14.479 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	52.013 degC	Op_point	IC junction temperature
24.	ICThetaJA	65.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	200.0 mA	Op_point	Iout operating point
26.	Phase Marg	65.124 deg	Op_point	Bode Plot Phase Margin
27.	VIN_OP	11.0 V	Op_point	Vin operating point
28.	Vout p-p	5.51 mV	Op_point	Peak-to-peak output ripple voltage
29.	Cin Pd	42.429 µW	Power	Input capacitor power dissipation
30.	Cout Pd	120.31 µW	Power	Output capacitor power dissipation
31.	Diode Pd	81.702 mW	Power	Diode power dissipation

#	Name	Value	Category	Description
32.	IC Pd	338.668 mW	Power	IC power dissipation
33.	L Pd	112.823 mW	Power	Inductor power dissipation
34.	Total Pd	536.118 mW	Power	Total Power Dissipation
35.	Vout Tolerance	3.576 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	200.0 m	Maximum Output Current
2.	VinMax	13.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	TPS61170	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS61170** Product Folder : http://www.ti.com/product/TPS61170 : contains the data sheet and other resources.