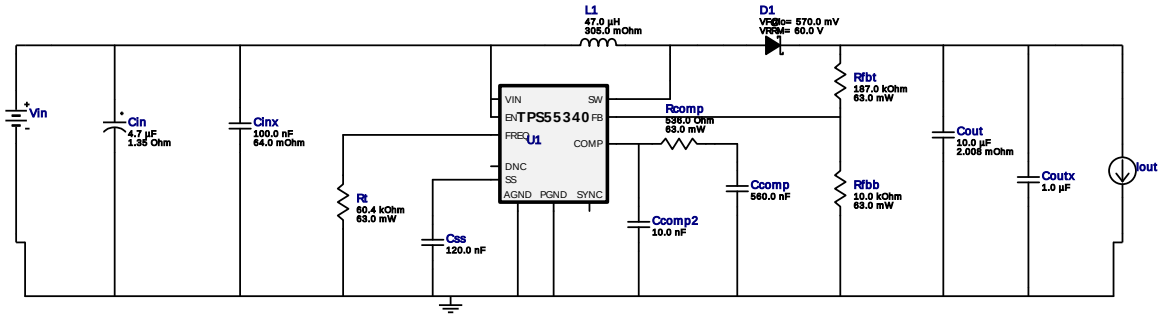
WEBENCH® Design Report

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

Device = TPS55340RTER
Topology = Boost
Created = 7/15/16 8:34:10 PM
BOM Cost = $4.06
BOM Count = 14
Total Pd = 0.3W

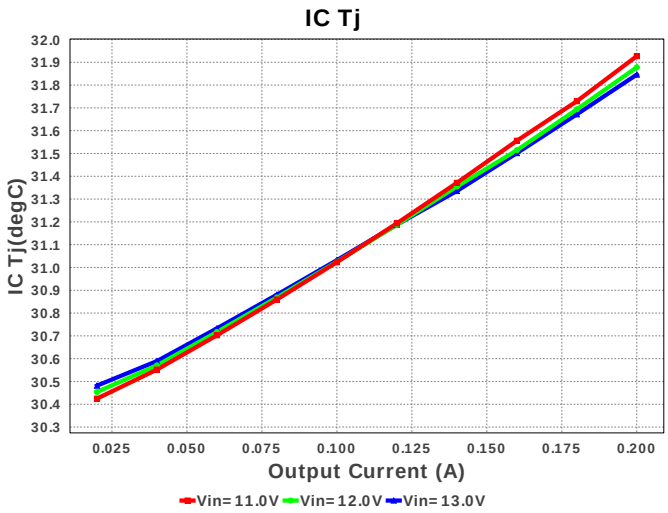
Design : 4742013/36 TPS55340RTER
TPS55340RTER 11.0V-13.0V to 24.00V @ 0.2A

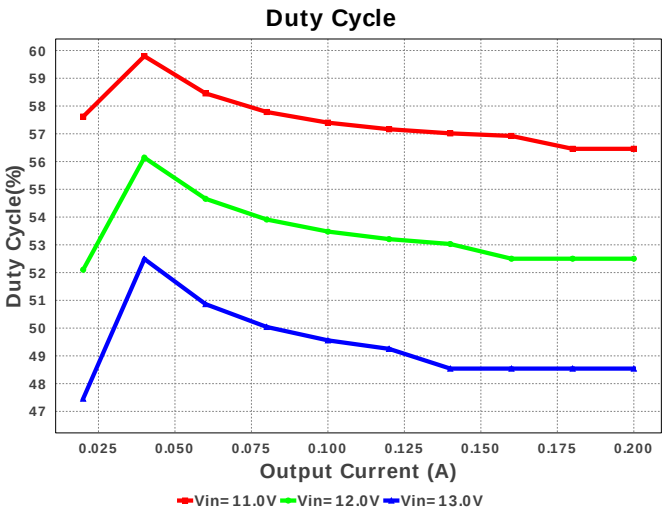


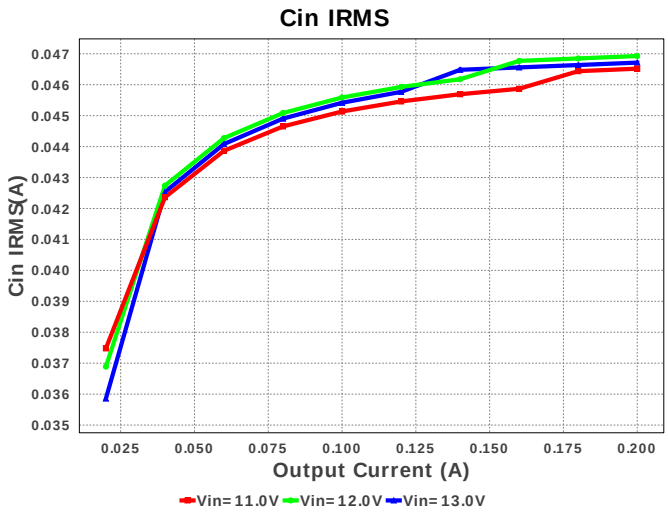
Electrical BOM

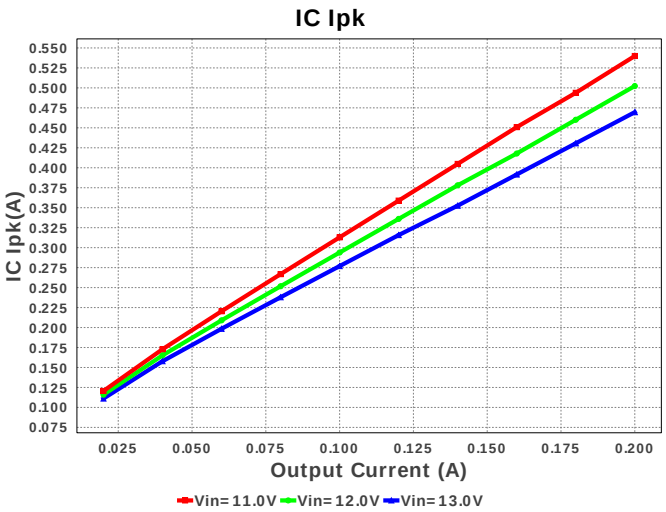
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	MuRata	GRM155R61A564KE15D Series= X5R	Cap= 560.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.03	0402 3 mm²
2.	Ccomp2	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	Panasonic	EEE-FK1V4R7R Series= FK	Cap= 4.7 uF ESR= 1.35 Ohm VDC= 35.0 V IRMS= 90.0 mA	1	$0.09	SM_RADIAL_B 47 mm²
4.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
5.	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
6.	Coutx	Taiyo Yuden	GMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 35.0 V IRMS= 0.0 A	1	$0.05	0805 7 mm²
7.	Css	MuRata	GRM155R61A124KE19D Series= X5R	Cap= 120.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm²
8.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
9.	L1	Wurth Elektronik	74408943470	L= 47.0 µH DCR= 305.0 mOhm	1	$1.70	SRR4038 34 mm²
10.	Rcomp	Vishay-Dale	CRCW0402536RFKED Series= CRCW..e3	Res= 536.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
12.	Rfbt	Vishay-Dale	CRCW0402187KFKED Series= CRCW..e3	Res= 187.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

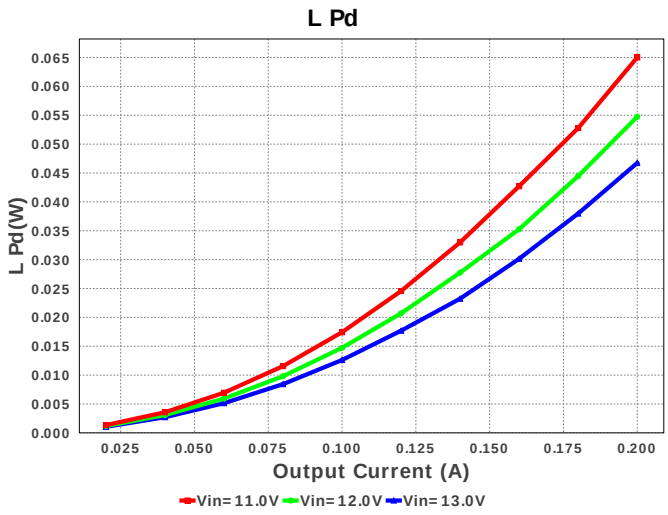
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	Rt	Vishay-Dale	CRCW040260K4FKED Series= CRCW..e3	Res= 60.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	U1	Texas Instruments	TPS55340RTER	Switcher	1	$1.85	S-PWQFN-N16 17 mm^2

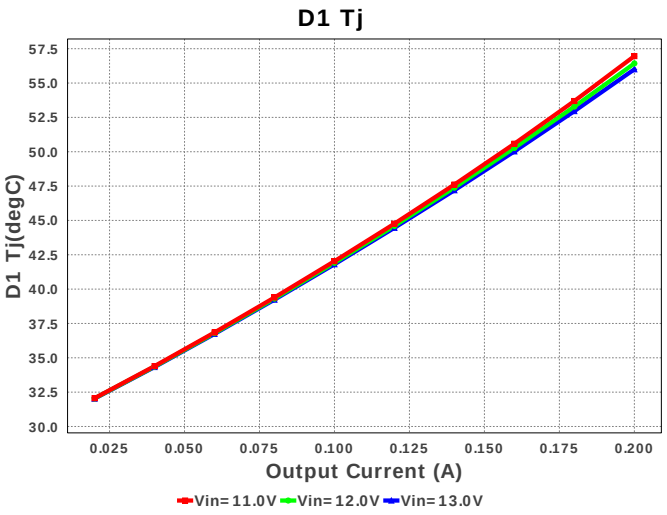


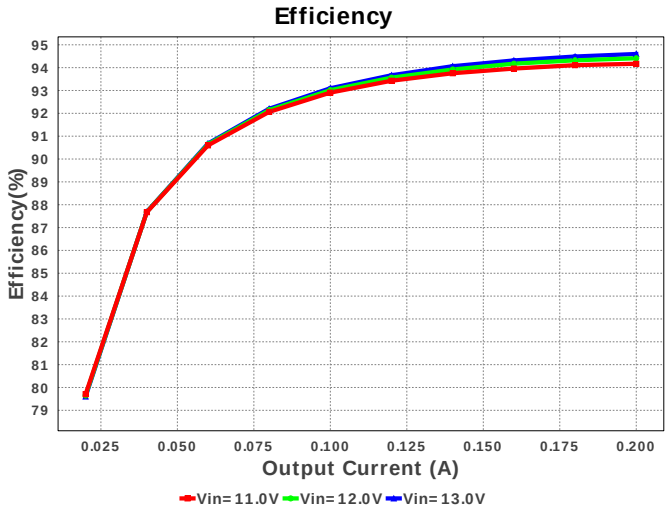


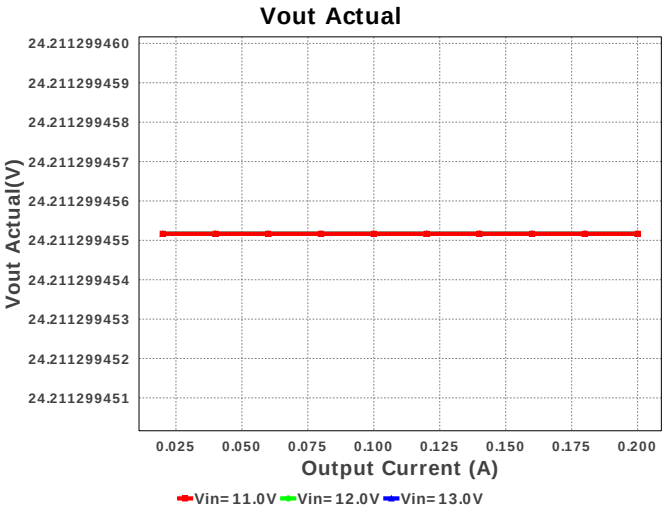


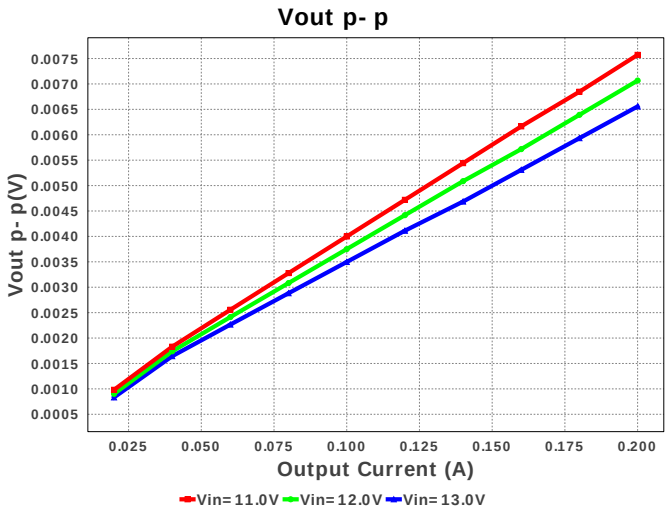


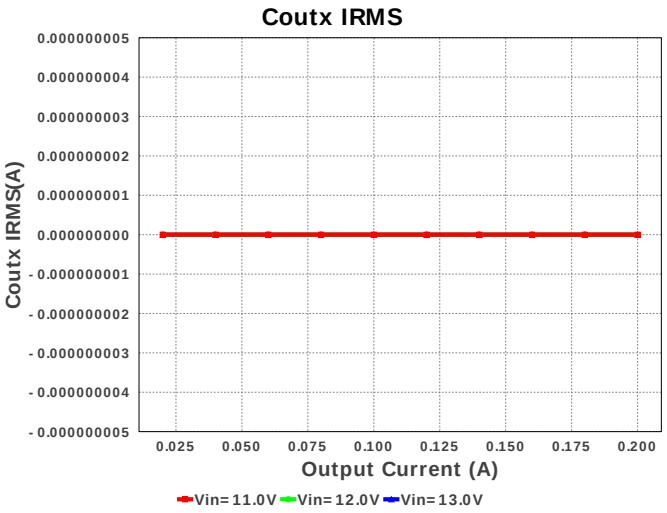


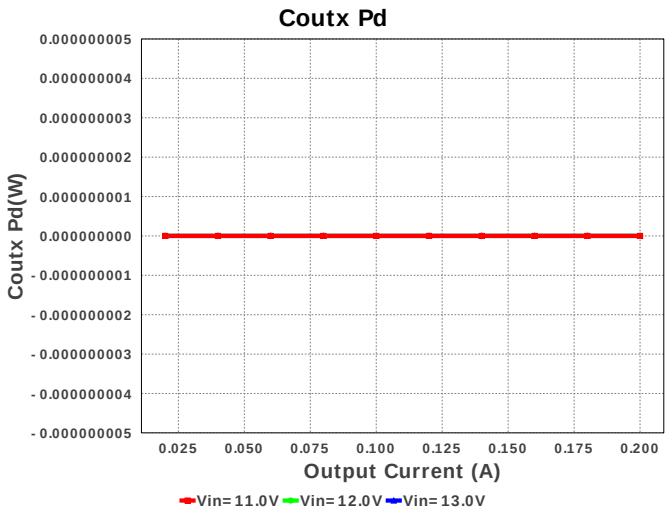


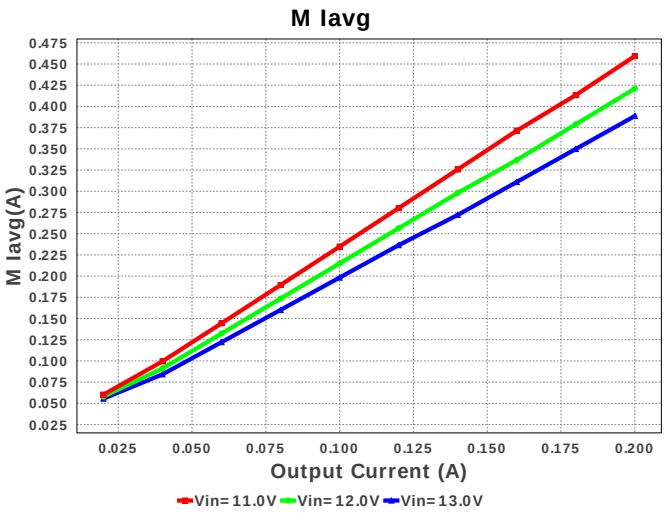


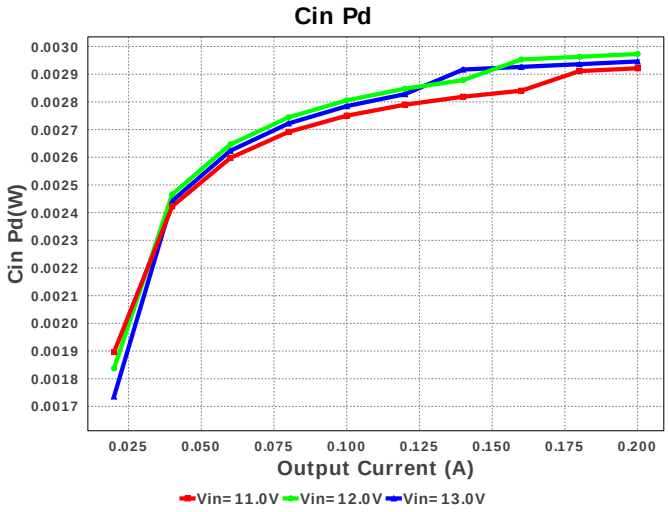


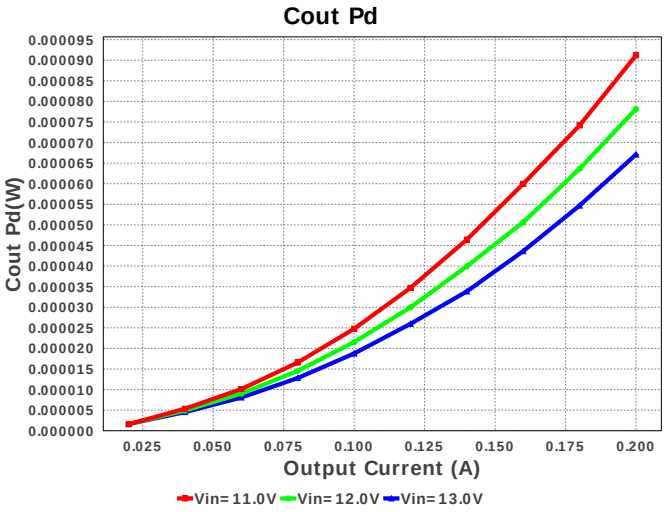


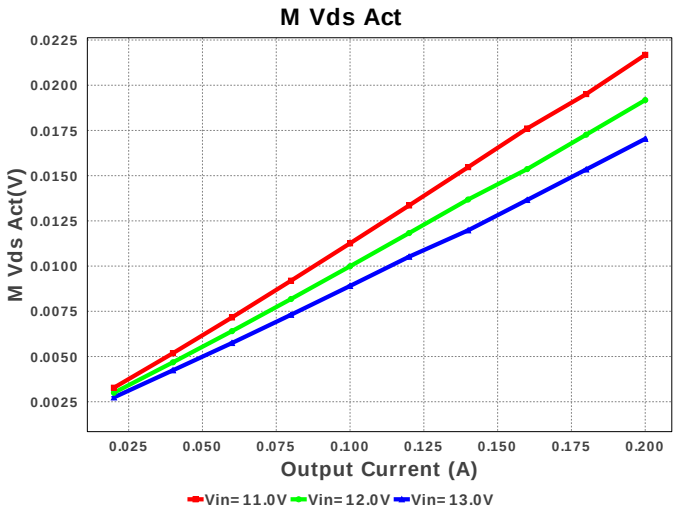


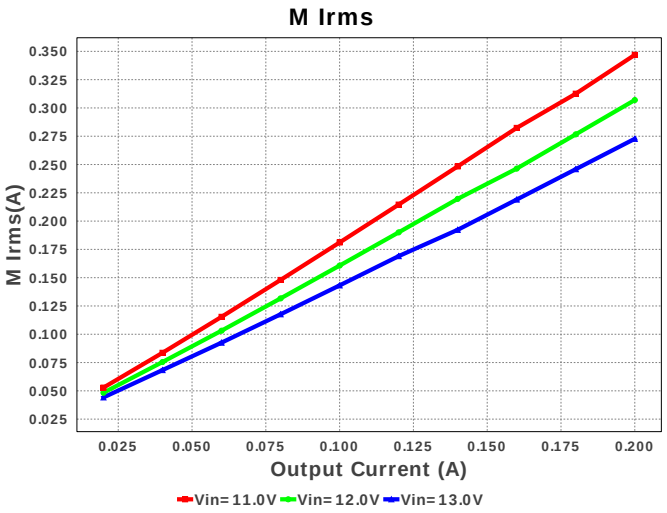


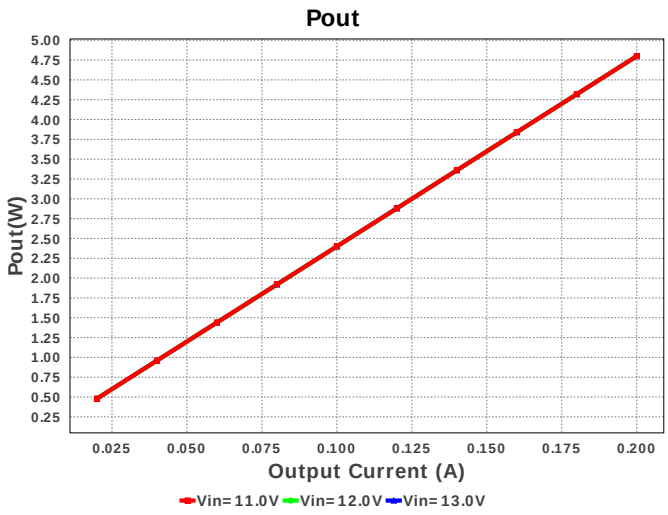


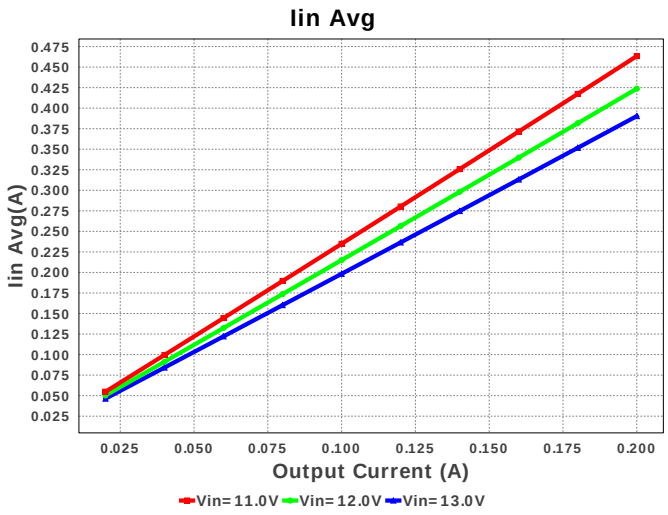


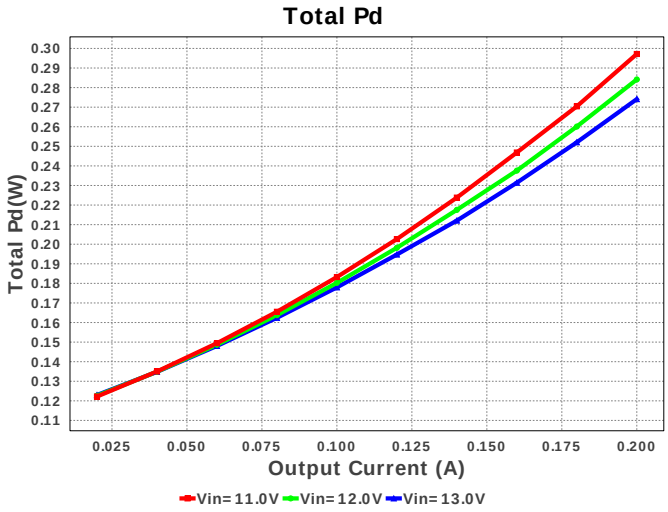


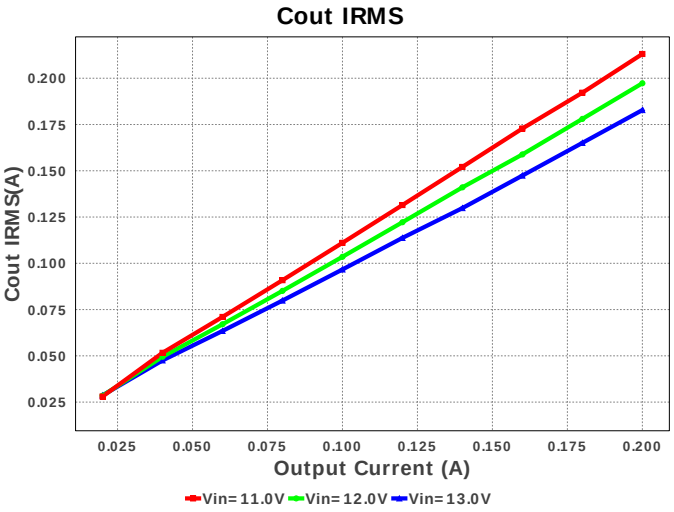


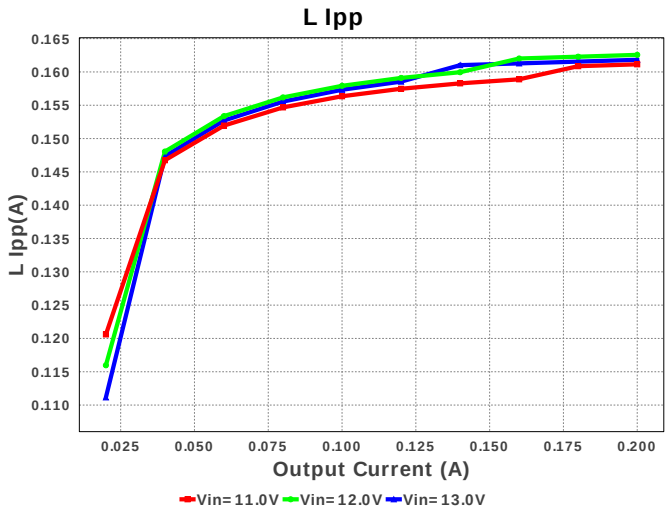


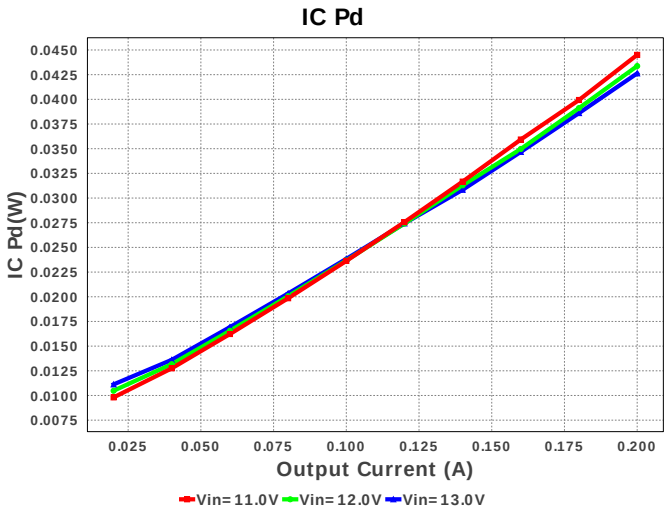


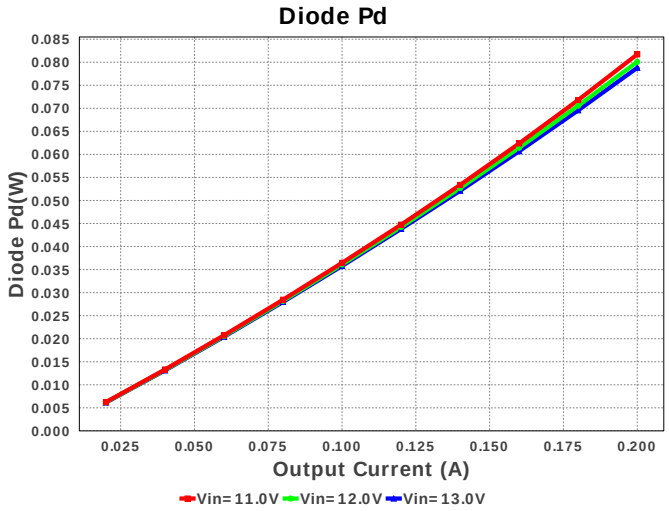


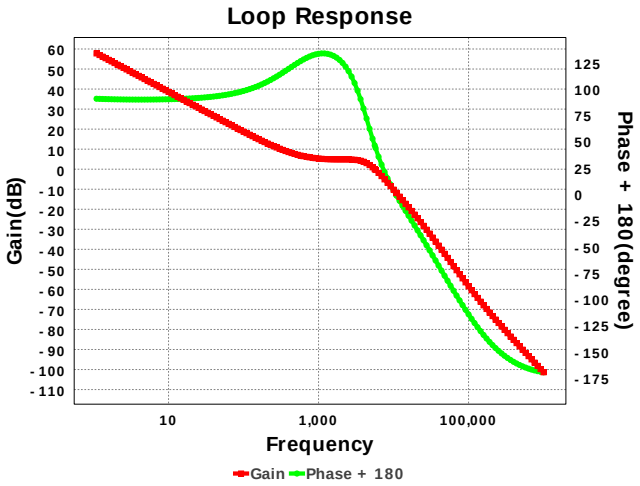












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	46.518 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	213.106 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	0.0 A	Current	Output capacitor_x RMS ripple current
4.	IC Ipk	539.902 mA	Current	Peak switch current in IC
5.	Iin Avg	463.38 mA	Current	Average input current
6.	L Ipp	161.14 mA	Current	Peak-to-peak inductor ripple current
7.	M Iavg	459.33 mA	Current	MOSFET Average current
8.	M1 Irms	346.9 mA	Current	Q Iavg
9.	BOM Count	14	General	Total Design BOM count
10.	FootPrint	163.0 mm^2	General	Total Foot Print Area of BOM components
11.	Frequency	778.91 kHz	General	Switching frequency
12.	IC Tolerance	9.0 mV	General	IC Feedback Tolerance
13.	M Vds Act	21.679 mV	General	Voltage drop across the MosFET
14.	Pout	4.8 W	General	Total output power
15.	Total BOM	$4.06	General	Total BOM Cost
16.	D1 Tj	56.962 degC	Op_Point	D1 junction temperature
17.	Low Freq Gain	58.226 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	24.211 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
20.	Cross Freq	4.023 kHz	Op_point	Bode plot crossover frequency
21.	Duty Cycle	56.458 %	Op_point	Duty cycle
22.	Efficiency	94.17 %	Op_point	Steady state efficiency
23.	Gain Marg	-14.128 dB	Op_point	Bode Plot Gain Margin
24.	IC Tj	31.927 degC	Op_point	IC junction temperature
25.	ICThetaJA	43.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
26.	IOUT_OP	200.0 mA	Op_point	Iout operating point
27.	Phase Marg	56.322 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	11.0 V	Op_point	Vin operating point
29.	Vout p-p	7.572 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	2.921 mW	Power	Input capacitor power dissipation
31.	Cout Pd	91.191 µW	Power	Output capacitor power dissipation
32.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
33.	Diode Pd	81.702 mW	Power	Diode power dissipation
34.	IC Pd	44.505 mW	Power	IC power dissipation
35.	L Pd	65.01 mW	Power	Inductor power dissipation
36.	Total Pd	297.166 mW	Power	Total Power Dissipation
37.	Vout Tolerance	2.664 %		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	TPS55340	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS55340** Product Folder : http://www.ti.com/product/TPS55340 : contains the data sheet and other resources.