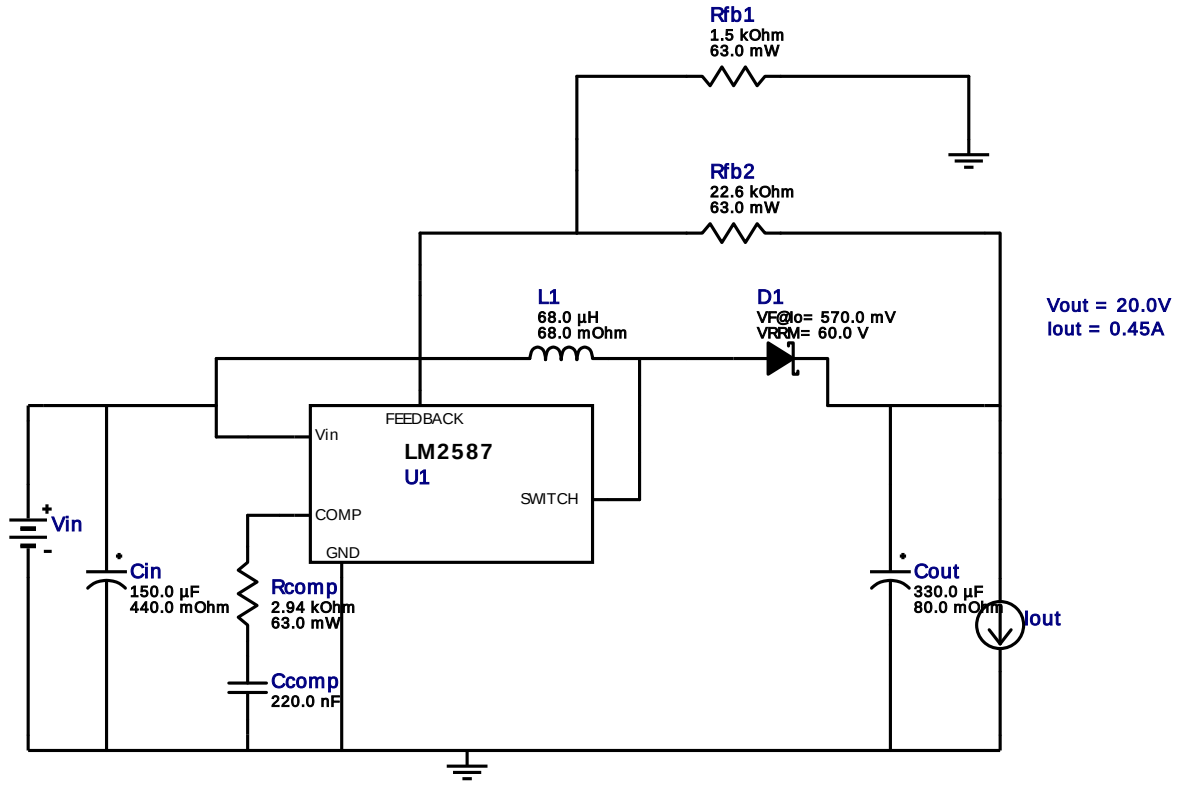
WEBENCH® Design Report

VinMin = 4.75V
VinMax = 5.5V
Vout = 20.0V
Iout = 0.45A

Device = LM2587S-ADJ/NOPB
Topology = Boost
Created = 10/28/16 9:37:00 AM
BOM Cost = $6.02
BOM Count = 9
Total Pd = 2.23W

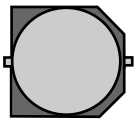
Design : 433359/238 LM2587S-ADJ/NOPB
LM2587S-ADJ/NOPB 4.75V-5.5V to 20.00V @ 0.45A

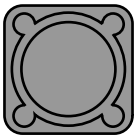
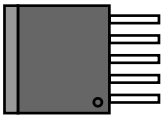


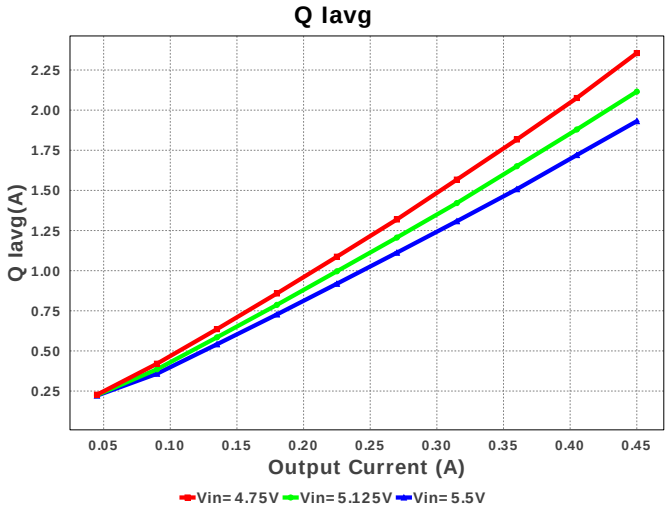
My Comments

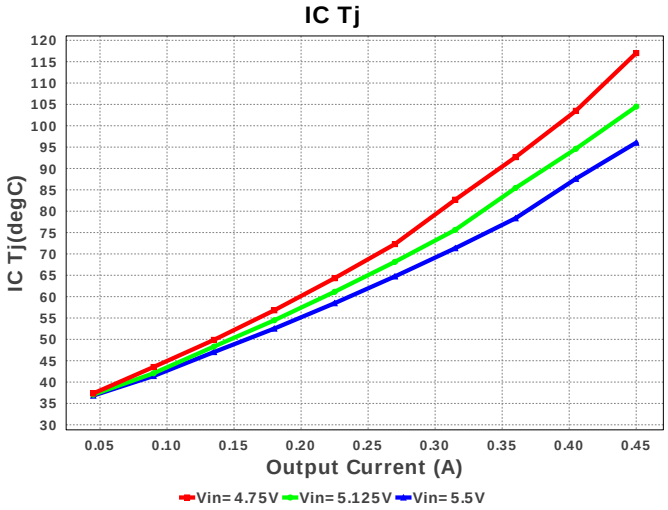
No comments

Electrical BOM

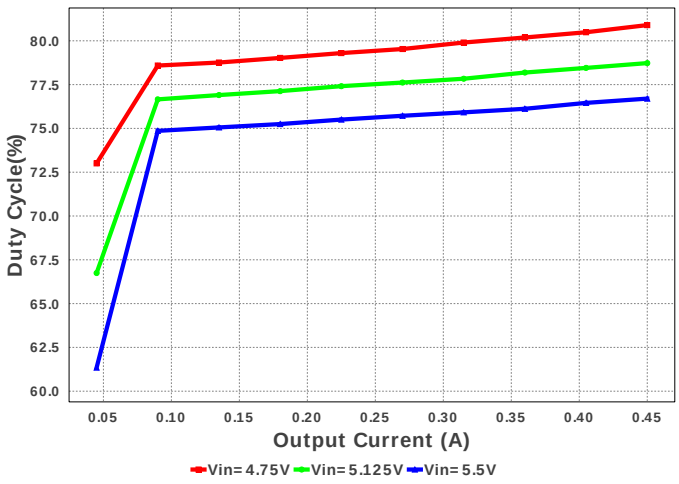
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	MuRata	GRM155C80G224KE01D Series= X6S	Cap= 220.0 nF VDC= 4.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
2.	Cin	Nichicon	UUD1A151MCL1GS Series= uD	Cap= 150.0 uF ESR= 440.0 mOhm VDC= 10.0 V IRMS= 230.0 mA	1	$0.11	 SM_RADIAL_6.3AMM 80 mm²
3.	Cout	Panasonic	EEE-FK1V331P Series= FK	Cap= 330.0 uF ESR= 80.0 mOhm VDC= 35.0 V IRMS= 850.0 mA	1	$0.28	 SM_RADIAL_G 172 mm²
4.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	 SOD-123F 12 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
5.	L1	Coilcraft	MSS1210-683MEB	L= 68.0 µH DCR= 68.0 mOhm	1	$0.81	 MSS1210 204 mm^2
6.	Rcomp	Vishay-Dale	CRCW04022K94FKED Series= CRCW..e3	Res= 2.94 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
7.	Rfb1	Vishay-Dale	CRCW04021K50FKED Series= CRCW..e3	Res= 1.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
8.	Rfb2	Vishay-Dale	CRCW040222K6FKED Series= CRCW..e3	Res= 22.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
9.	U1	Texas Instruments	LM2587S-ADJ/NOPB	Switcher	1	$4.74	 TS5B 199 mm^2

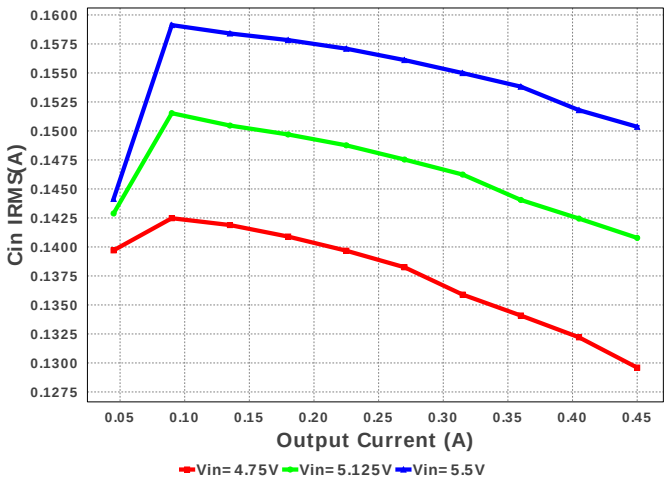




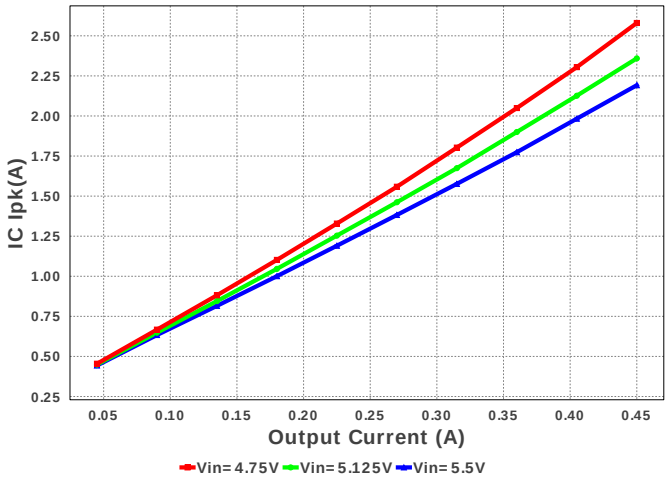
Duty Cycle



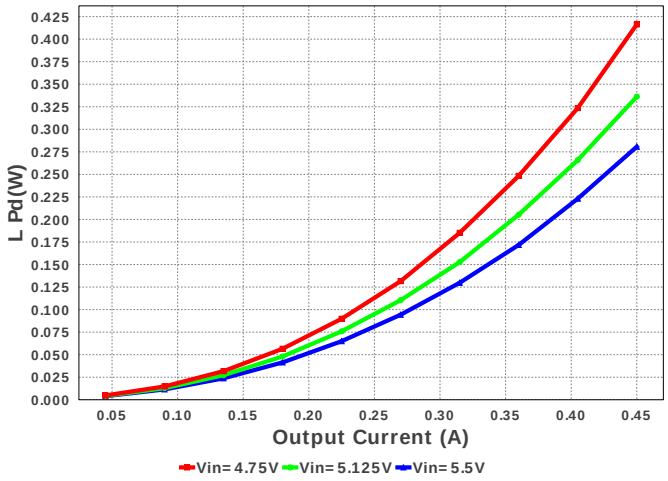
Cin IRMS



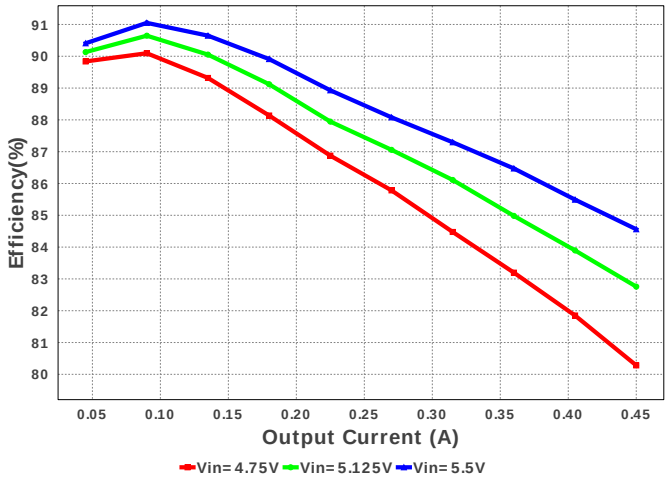
IC Ipk



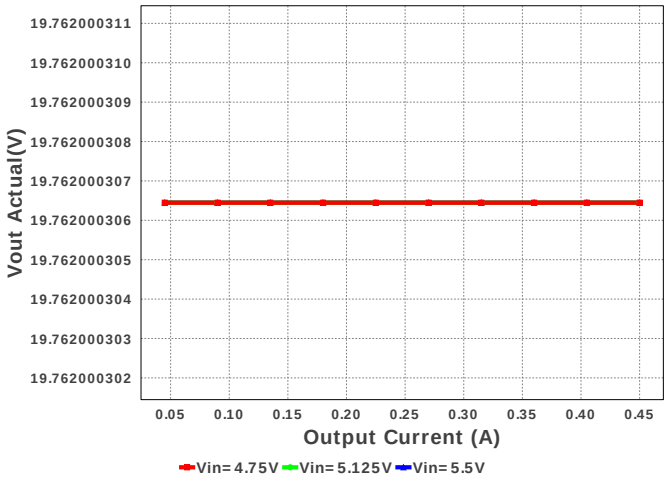
L Pd

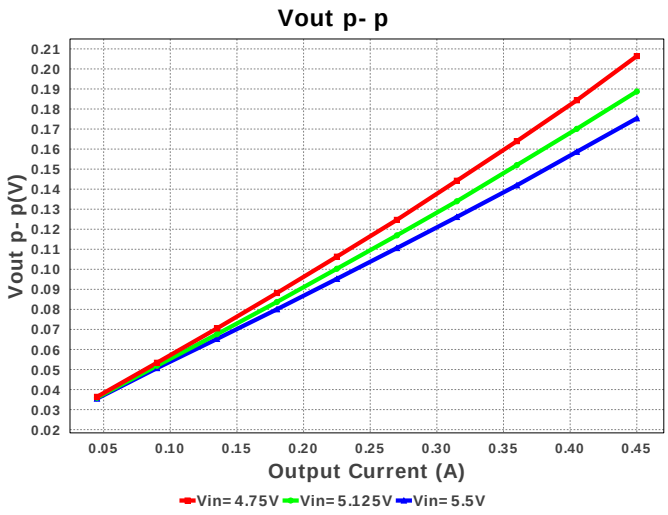


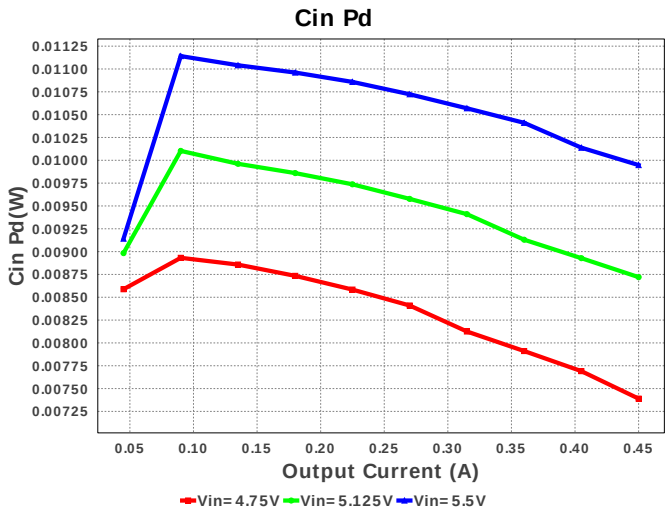
Efficiency

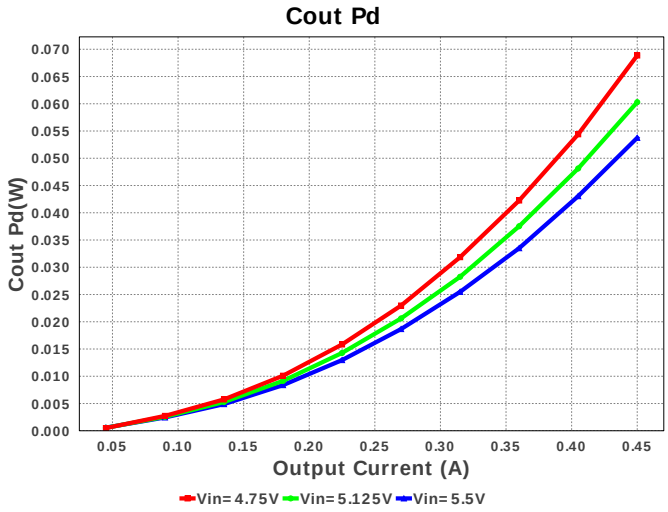


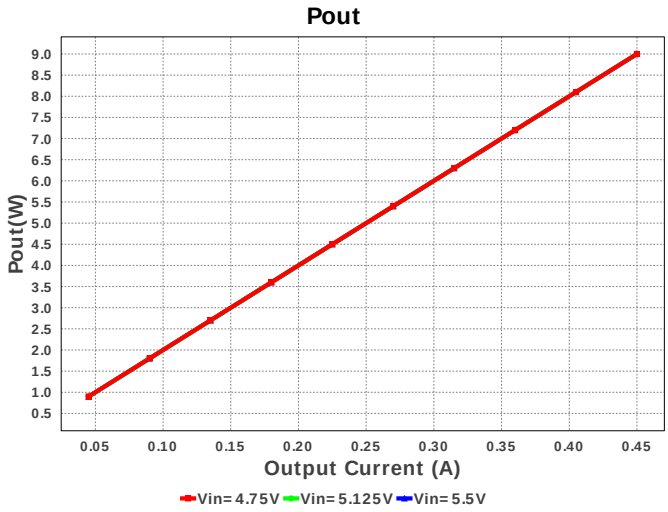
Vout Actual

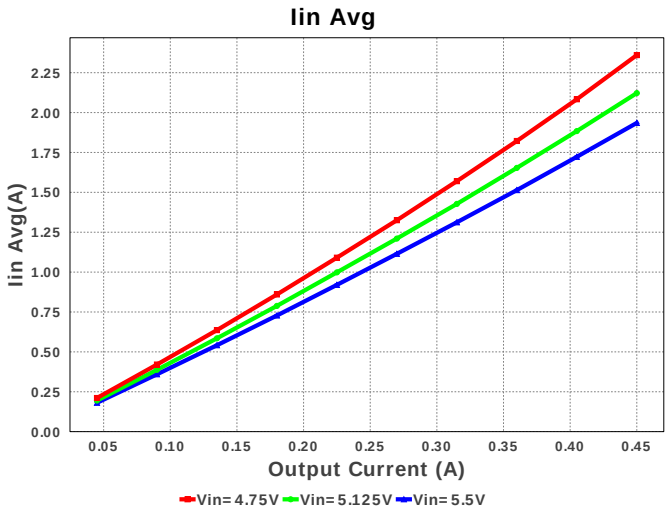


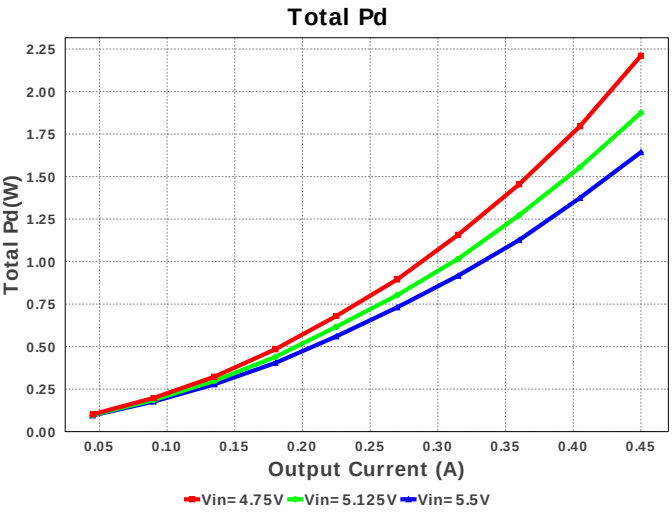


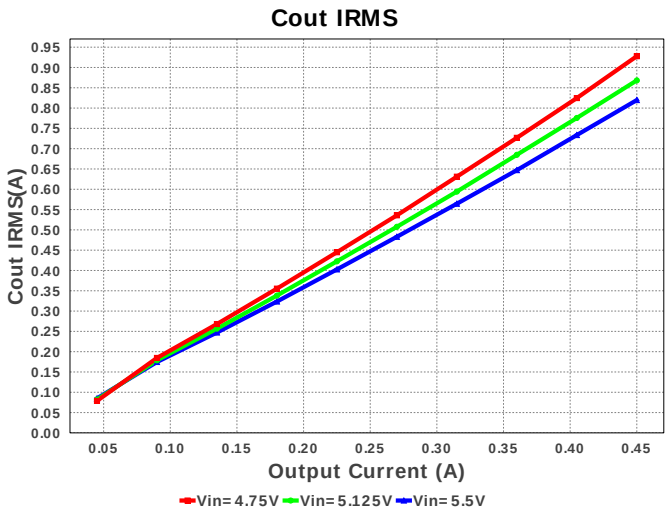


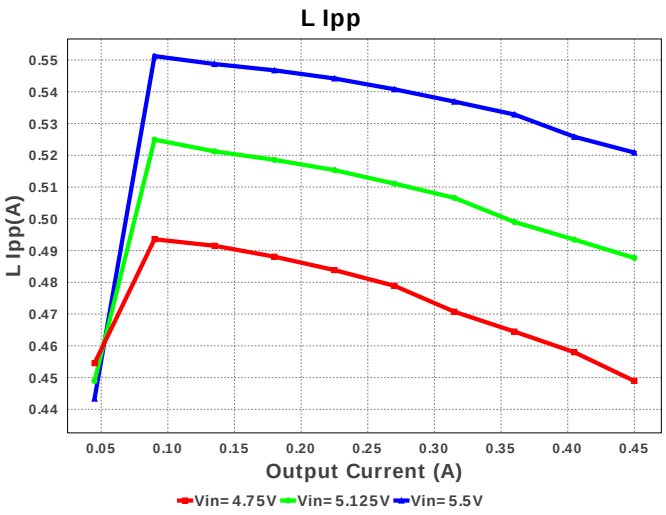


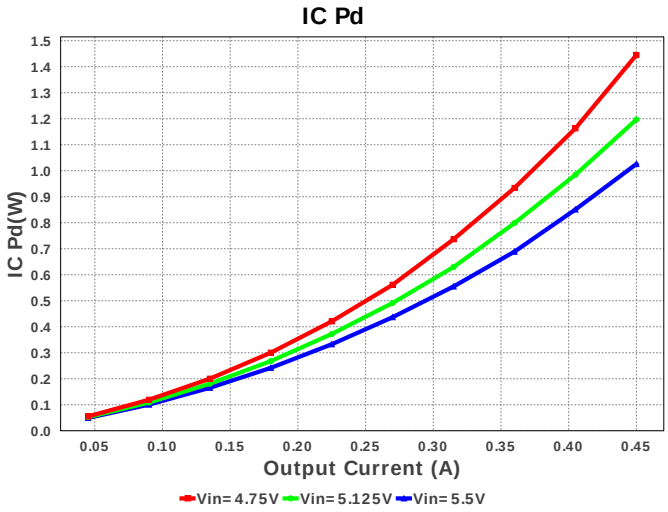


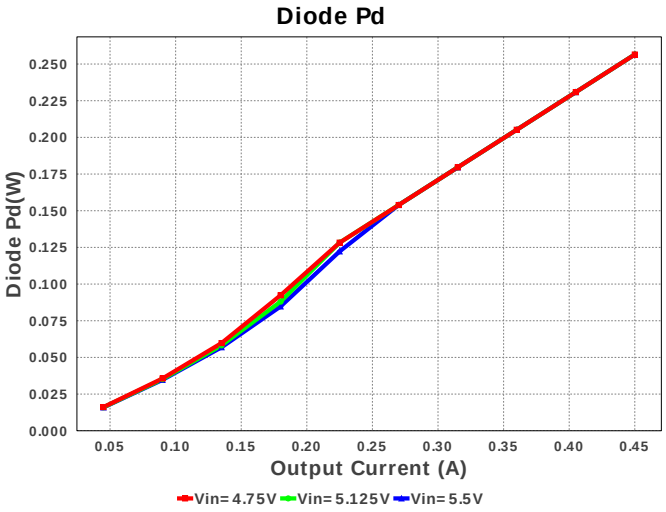


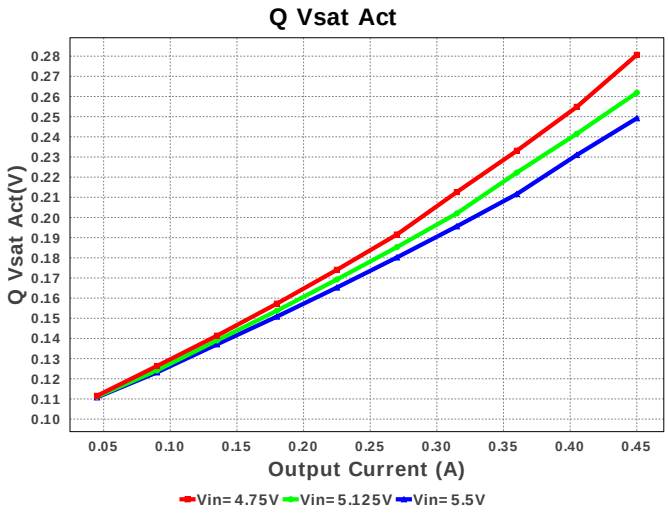


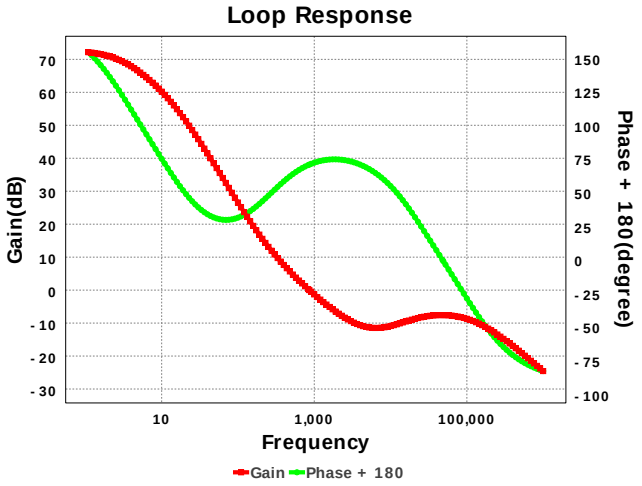












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	129.168 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	929.65 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.587 A	Current	Peak switch current in IC
4.	Iin Avg	2.365 A	Current	Average input current
5.	L Ipp	447.45 mA	Current	Peak-to-peak inductor ripple current
6.	Q Iavg	2.363 A	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	679.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	100.0 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	9.0 W	General	Total output power
13.	Q Vsat Act	286.056 mV	General	Q Vsat
14.	Total BOM	$6.02	General	Total BOM Cost
15.	Low Freq Gain	71.513 dB	Op_Point	Gain at 10Hz
16.	Vout Actual	19.762 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Cross Freq	720.102 Hz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	80.96 %	Op_point	Duty cycle
19.	Efficiency	80.129 %	Op_point	Steady state efficiency
20.	Gain Marg	-4.784 dB	Op_point	Bode Plot Gain Margin
21.	IC Tj	120.621 degC	Op_point	IC junction temperature
22.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	450.0 mA	Op_point	Iout operating point
24.	Phase Marg	66.366 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	4.75 V	Op_point	Vin operating point
26.	Vout p-p	206.977 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	7.341 mW	Power	Input capacitor power dissipation
28.	Cout Pd	69.14 mW	Power	Output capacitor power dissipation
29.	Diode Pd	256.5 mW	Power	Diode power dissipation
30.	IC Pd	1.463 W	Power	IC power dissipation
31.	L Pd	419.088 mW	Power	Inductor power dissipation
32.	Total Pd	2.232 W	Power	Total Power Dissipation
33.	Vout Tolerance	1.894 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	450.0 m	Maximum Output Current
2.	VinMax	5.5	Maximum input voltage
3.	VinMin	4.75	Minimum input voltage
4.	Vout	20.0	Output Voltage
5.	base_pn	LM2587	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM2587** Product Folder : http://www.ti.com/product/LM2587 : contains the data sheet and other resources.