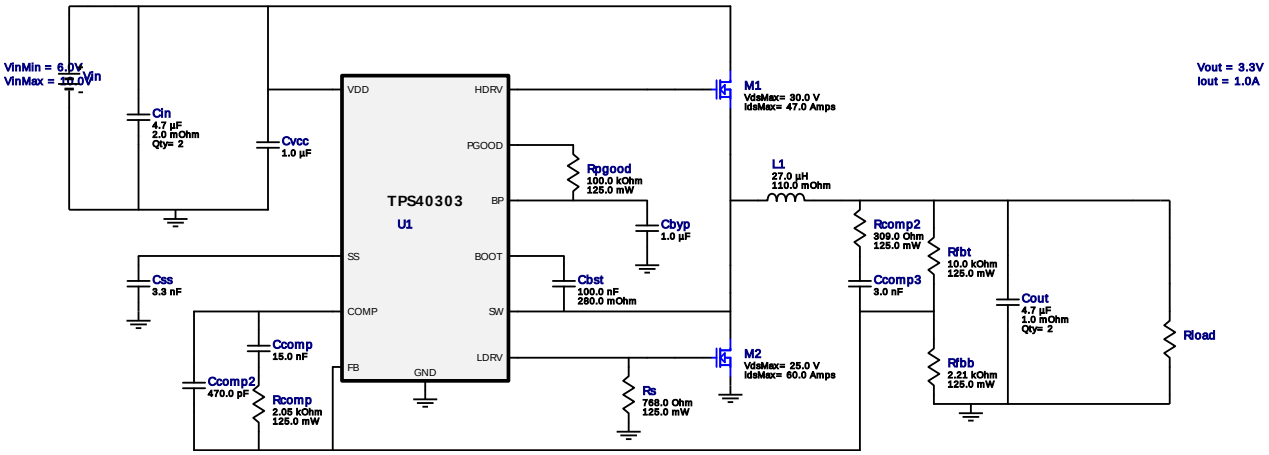
WEBENCH® Design Report

VinMin = 6.0V
VinMax = 10.0V
Vout = 3.3V
Iout = 1.0A

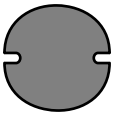
Device = TPS40303DRCR
Topology = Buck
Created = 7/6/15 4:28:14 AM
BOM Cost = $2.33
Footprint = 299.0 mm^2
BOM Count = 21
Total Pd = 0.57W

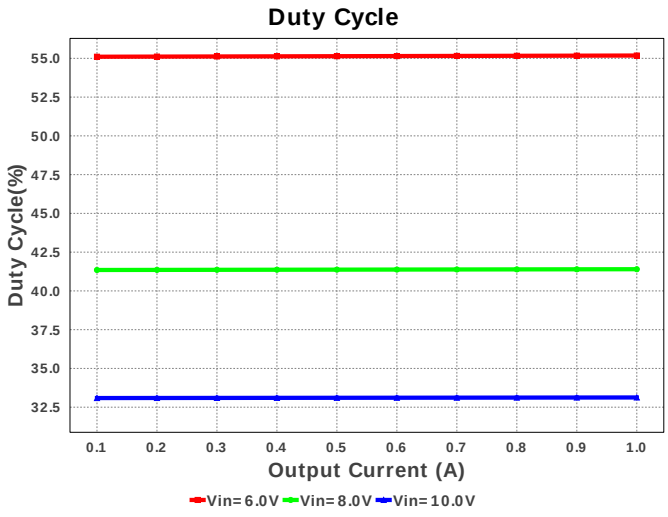
Design : 4049284/8 TPS40303DRCR
TPS40303DRCR 6.0V-10.0V to 3.30V @ 1.0A

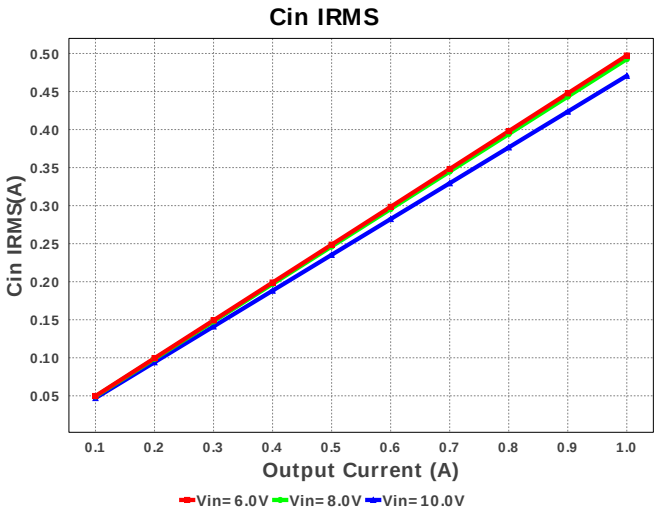


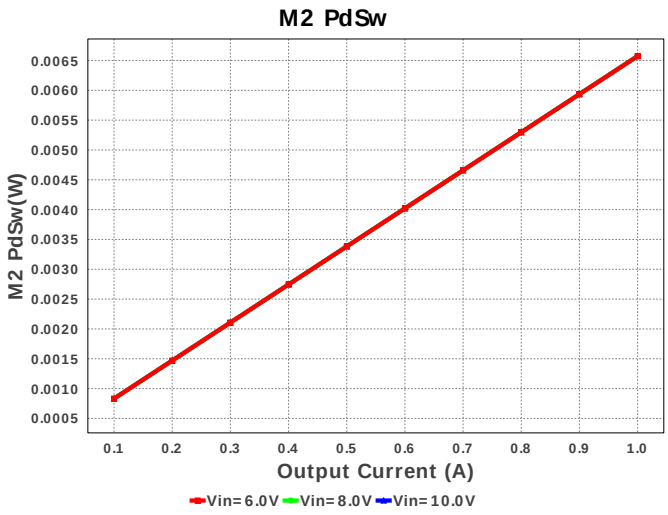
Electrical BOM

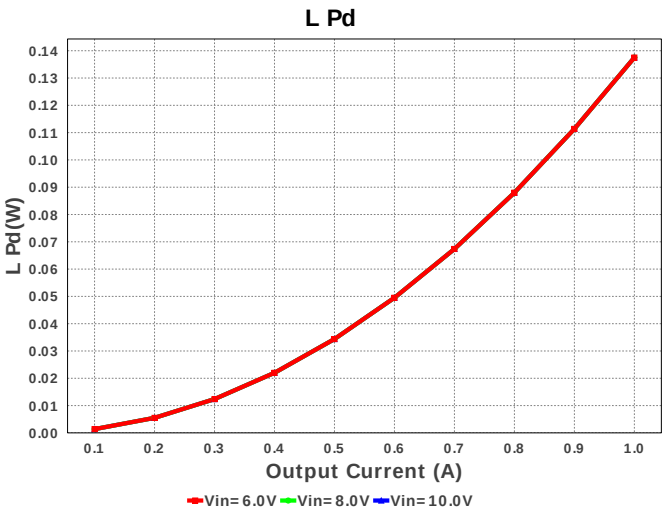
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
2.	Cbyp	Taiyo Yuden	LMK212B7105KD-T Series= X7R	Cap= 1.0 uF VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm^2
3.	Ccomp	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
4.	Ccomp2	Yageo America	CC0805KRX7R9BB471 Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
5.	Ccomp3	MuRata	GRM2165C1H302JA01D Series= C0G/NP0	Cap= 3.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.04	0805 7 mm^2
6.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	2	$0.06	0805 7 mm^2
7.	Cout	MuRata	GRM188R60J475ME19D Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	2	$0.02	0603 5 mm^2
8.	Css	MuRata	GRM033R71A332KA01D Series= X7R	Cap= 3.3 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
9.	Cvcc	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm^2

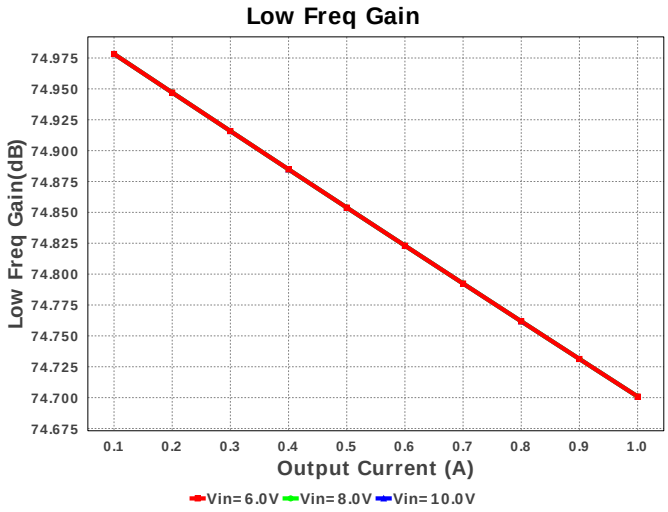
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	L1	Bourns	SDR1006-270KL	L= 27.0 µH DCR= 110.0 mOhm	1	$0.27	 SDR1006 139 mm²
11.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 47.0 Amps	1	$0.34	 TRANS_NexFET_Q3 19 mm²
12.	M2	Texas Instruments	CSD16323Q3	VdsMax= 25.0 V IdsMax= 60.0 Amps	1	$0.44	 TRANS_NexFET_Q3 19 mm²
13.	Rcomp	Panasonic	ERJ-6ENF2051V Series= 225	Res= 2.05 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
14.	Rcomp2	Vishay-Dale	CRCW0805309RFKEA Series= CRCW..e3	Res= 309.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
15.	Rfbb	Panasonic	ERJ-6ENF2211V Series= 225	Res= 2.21 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
16.	Rfbt	Panasonic	ERJ-6ENF1002V Series= 225	Res= 10.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
17.	Rpgood	Panasonic	ERJ-6ENF1003V Series= 225	Res= 100.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
18.	Rs	Vishay-Dale	CRCW0805768RFKEA Series= CRCW..e3	Res= 768.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
19.	U1	Texas Instruments	TPS40303DRCR	Switcher	1	$0.95	 S-PVSON-N10 17 mm²

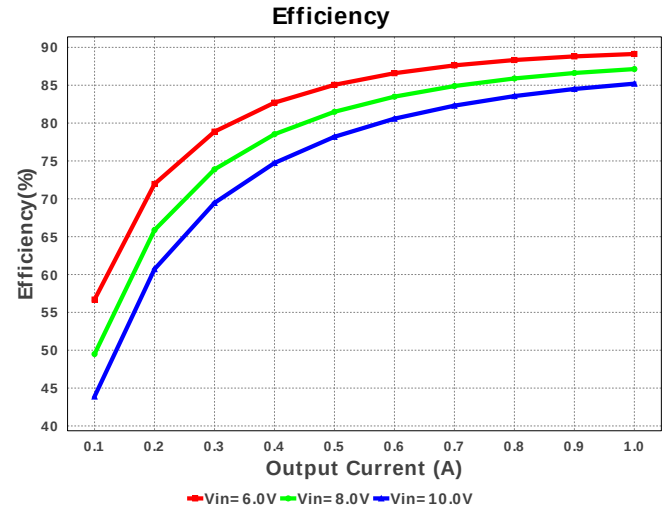


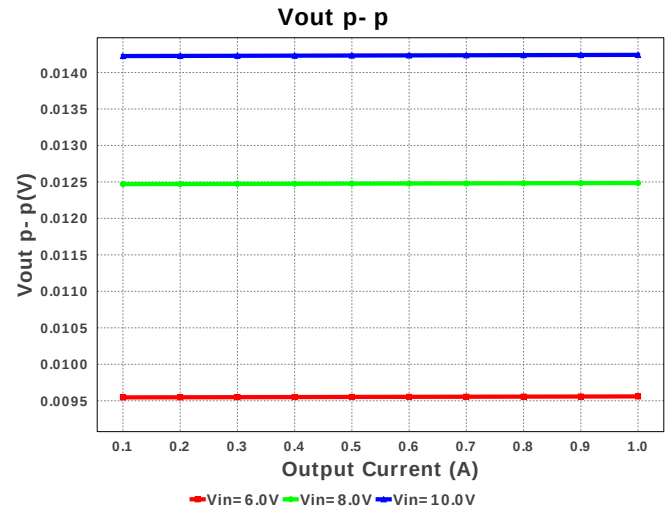


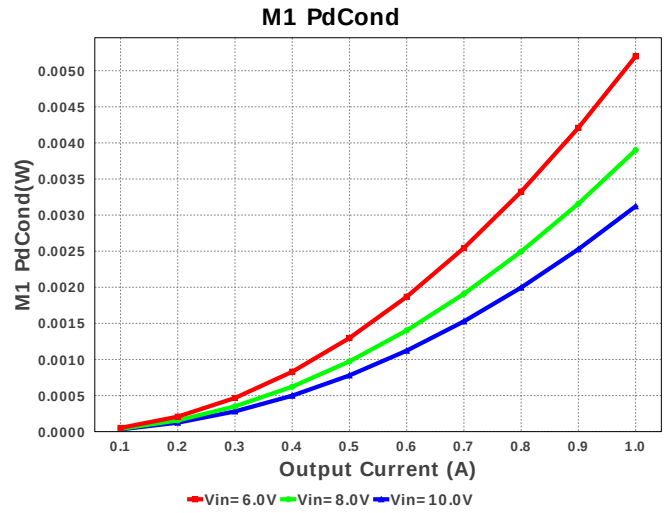




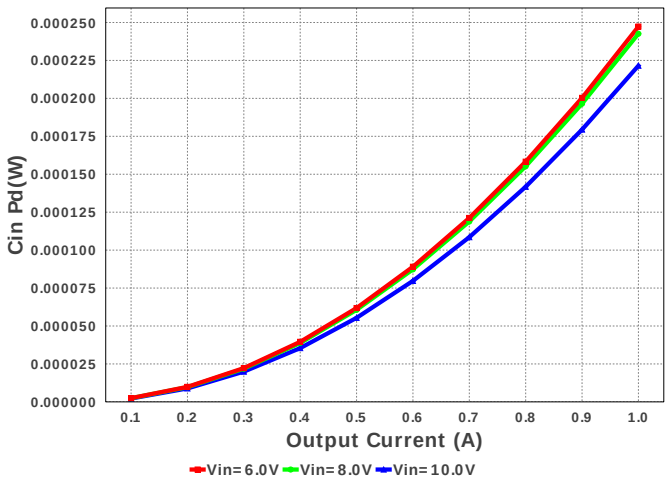




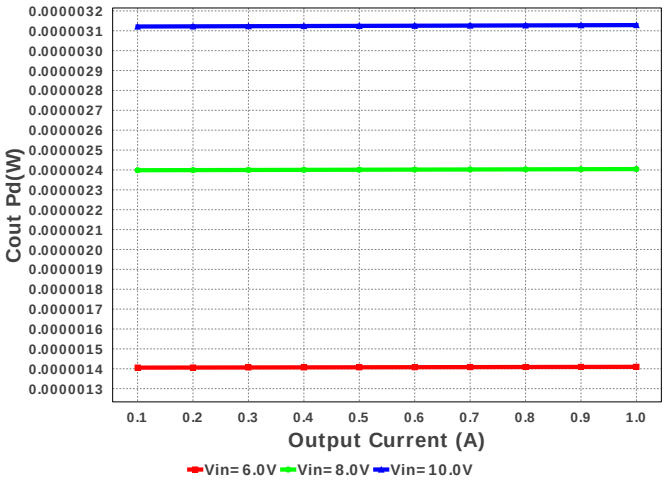




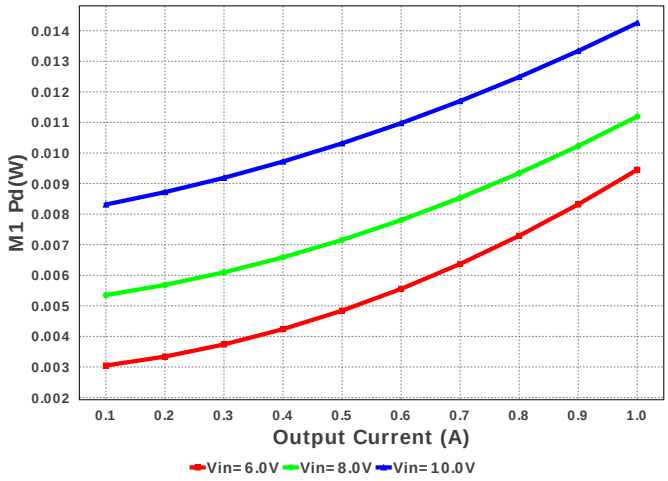
Cin Pd



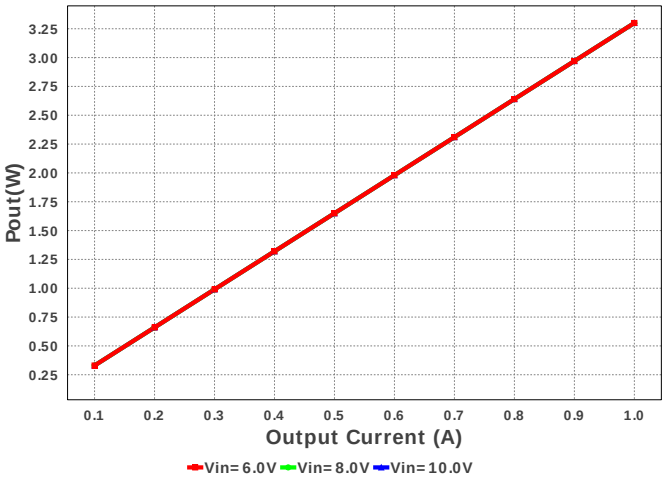
Cout Pd



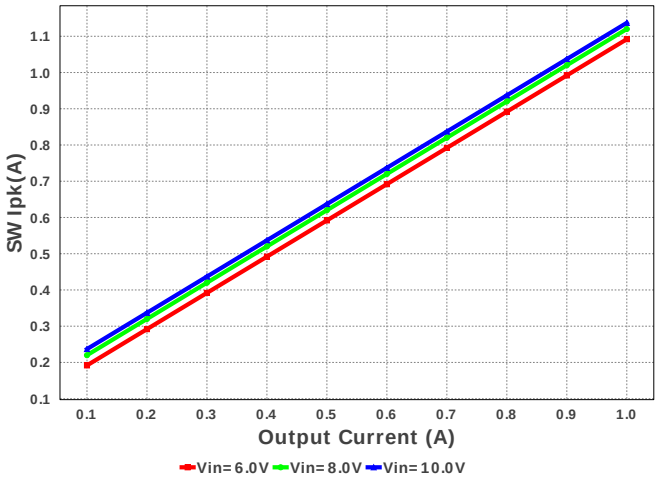
M1 Pd



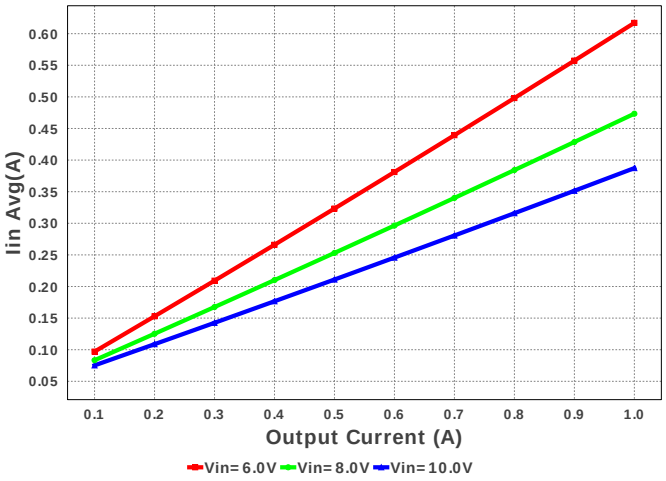
Pout

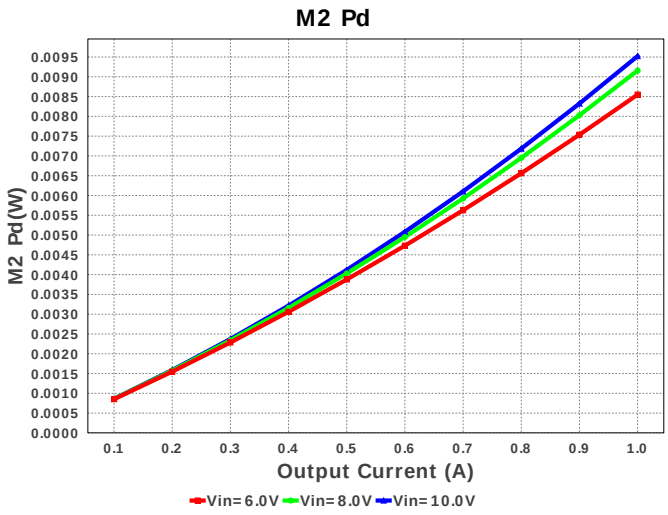


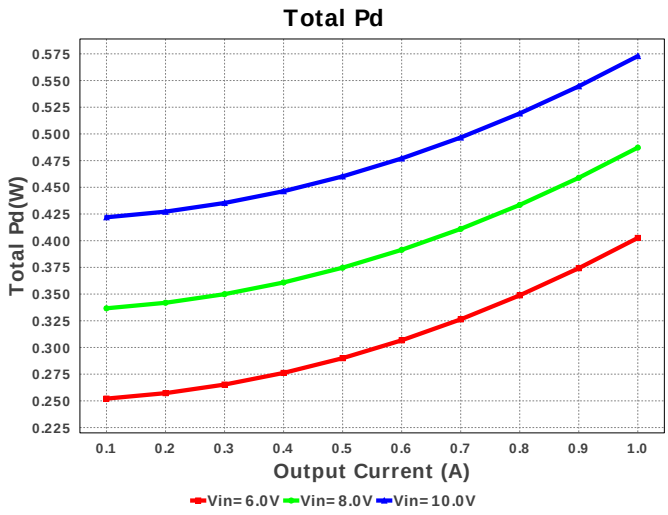
SW Ipk

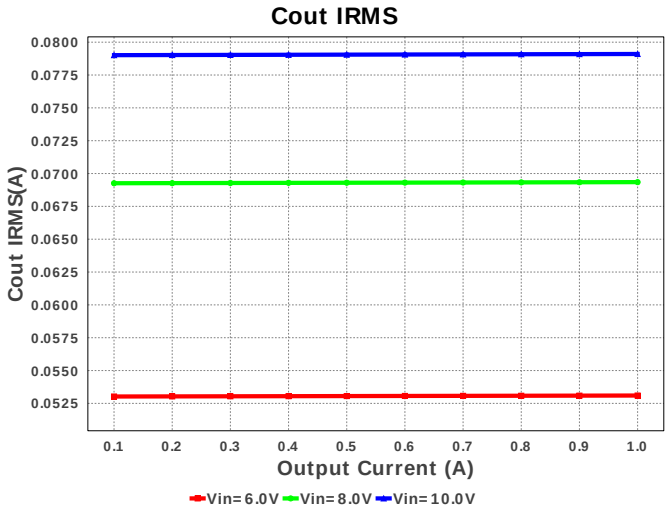


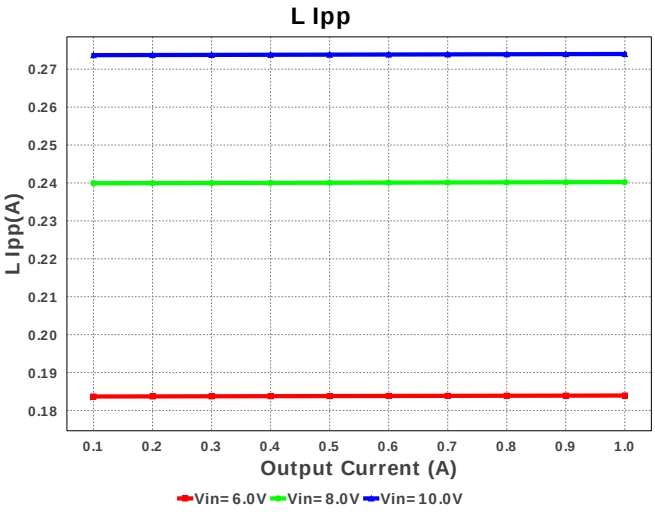
Iin Avg

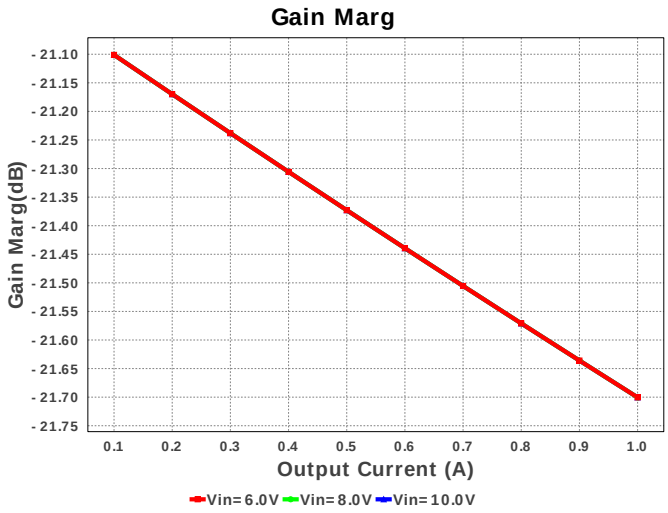


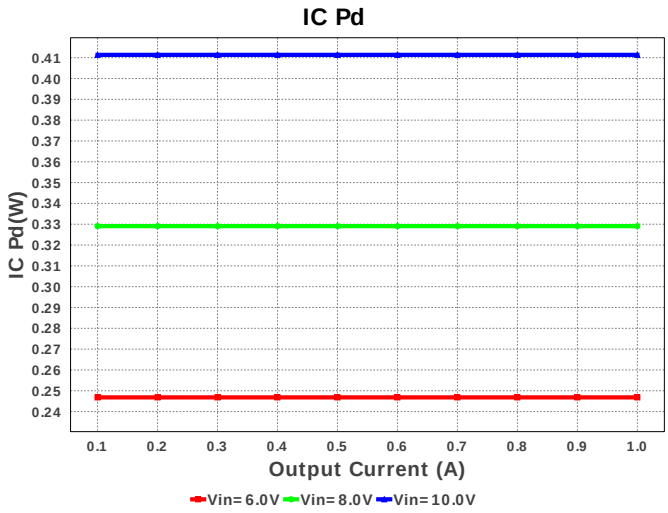


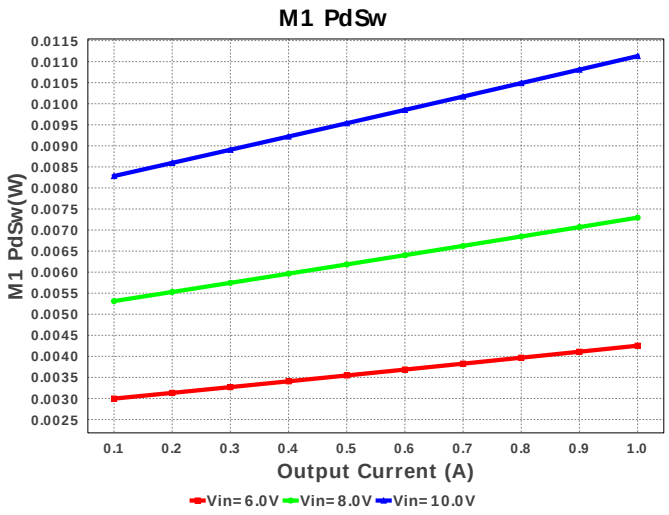


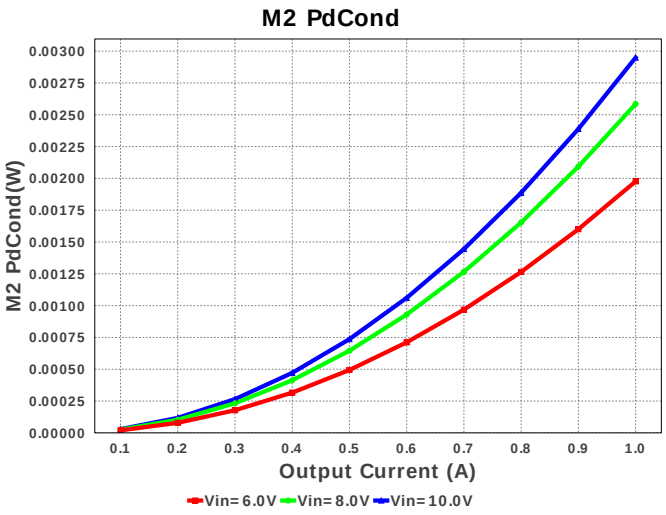


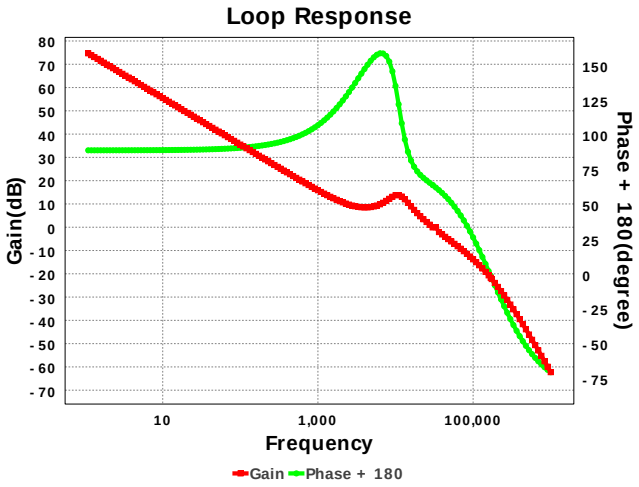












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	470.671 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	79.101 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	387.29 mA	Current	Average input current
4.	L Ipp	274.02 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	1.137 A	Current	Peak switch current
6.	BOM Count	21	General	Total Design BOM count
7.	FootPrint	299.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	300.0 kHz	General	Switching frequency
9.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
10.	Pout	3.3 W	General	Total output power
11.	Total BOM	$2.33	General	Total BOM Cost
12.	Low Freq Gain	74.725 dB	Op_Point	Gain at 10Hz
13.	Cross Freq	30.229 kHz	Op_point	Bode plot crossover frequency
14.	Duty Cycle	33.127 %	Op_point	Duty cycle
15.	Efficiency	85.208 %	Op_point	Steady state efficiency
16.	Gain Marg	-21.695 dB	Op_point	Bode Plot Gain Margin
17.	IOUT_OP	1.0 A	Op_point	Iout operating point
18.	Phase Marg	64.879 deg	Op_point	Bode Plot Phase Margin
19.	VIN_OP	10.0 V	Op_point	Vin operating point
20.	Vout p-p	14.242 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	221.531 µW	Power	Input capacitor power dissipation
22.	Cout Pd	3.129 µW	Power	Output capacitor power dissipation
23.	IC Pd	411.36 mW	Power	IC power dissipation
24.	L Pd	137.5 mW	Power	Inductor power dissipation
25.	M1 Pd	14.253 mW	Power	M1 MOSFET total power dissipation
26.	M1 PdCond	3.122 mW	Power	M1 MOSFET conduction losses
27.	M1 PdSw	11.131 mW	Power	M1 MOSFET switching losses
28.	M2 Pd	9.523 mW	Power	M2 MOSFET total power dissipation
29.	M2 PdCond	2.949 mW	Power	M2 MOSFET conduction losses
30.	M2 PdSw	6.574 mW	Power	M2 MOSFET switching losses
31.	Total Pd	572.879 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	Iout1	1.0	Output Current #1
3.	VinMax	10.0	Maximum input voltage
4.	VinMin	6.0	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	Vout1	3.3	Output Voltage #1
7.	base_pn	TPS40303	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0	Ambient temperature

Design Assistance

1. TPS40303 Product Folder : http://www.ti.com/product/TPS40303 : contains the data sheet and other resources.