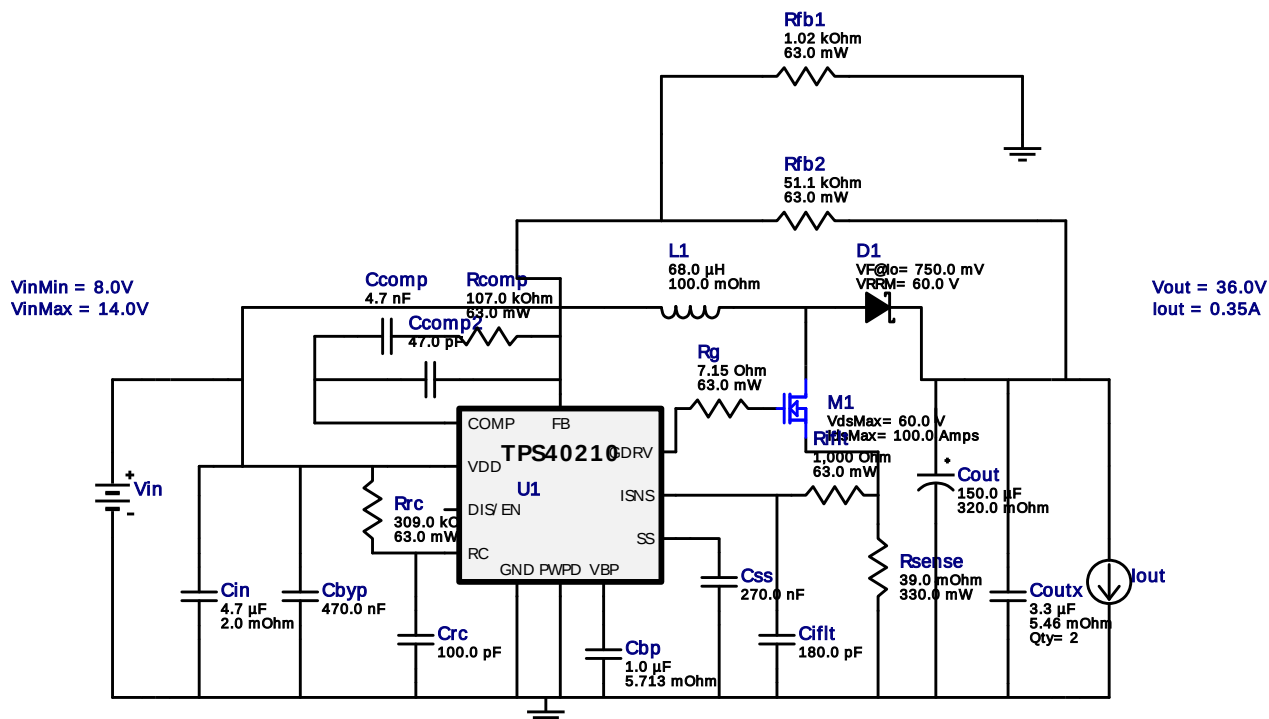


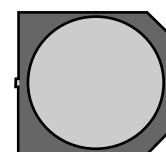
WEBENCH® Design Report

Design : 4084856/48 TPS40210DGQR
TPS40210DGQR 8.0V-14.0V to 35.76862745098039V @ 0.35A



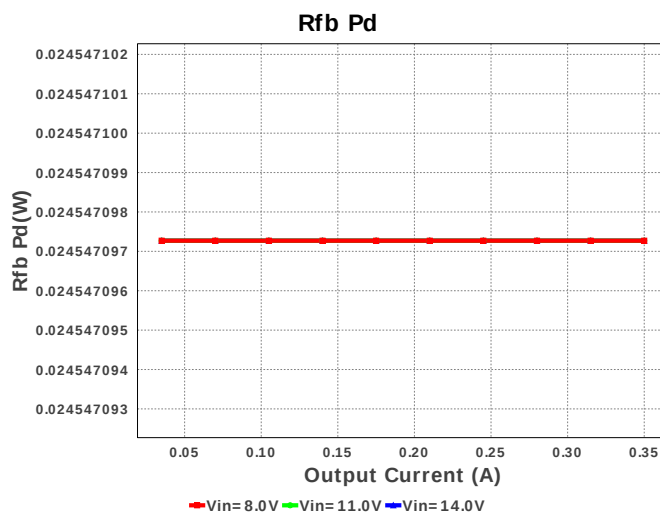
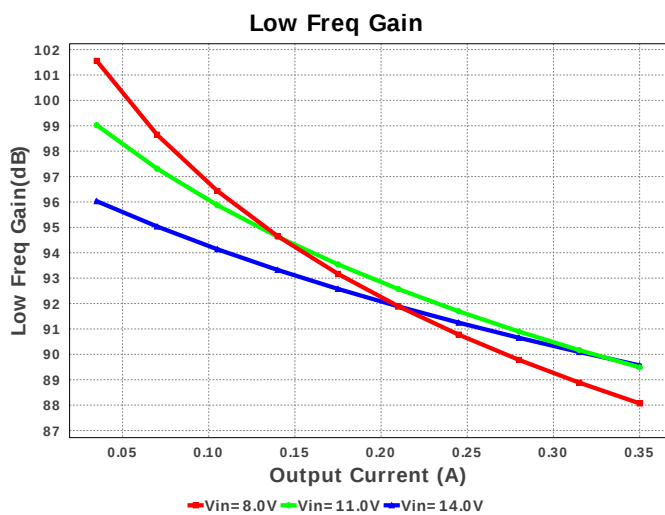
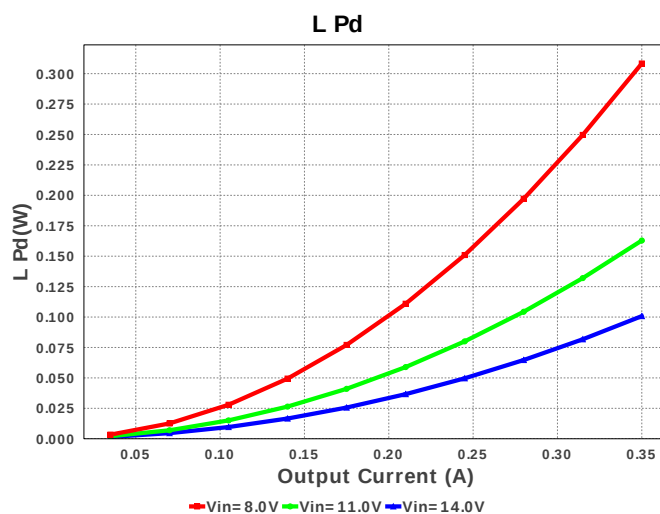
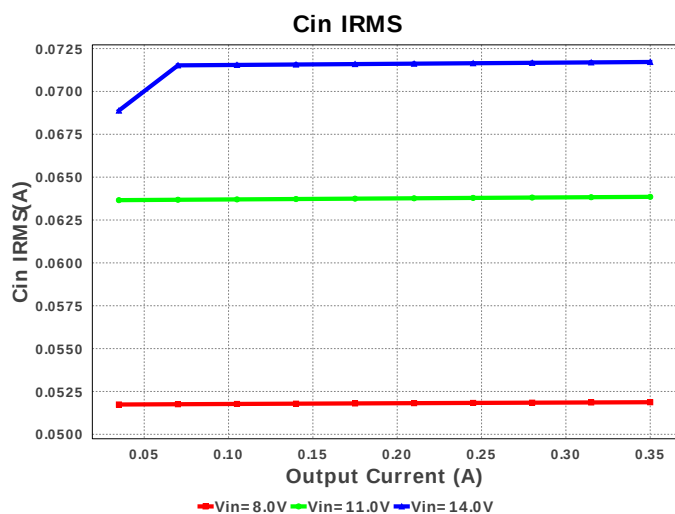
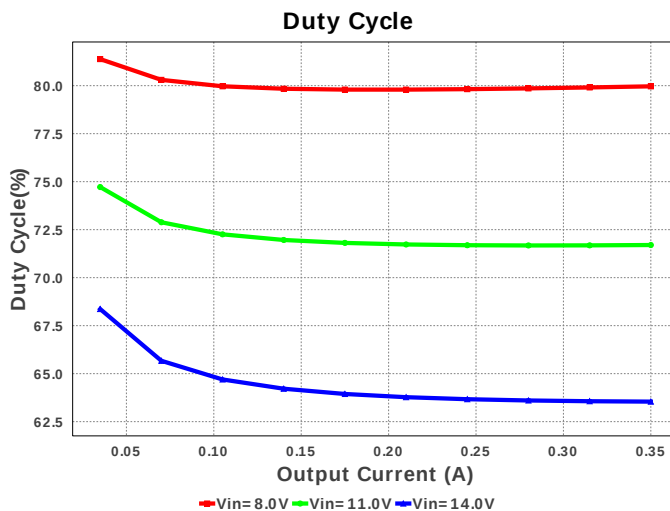
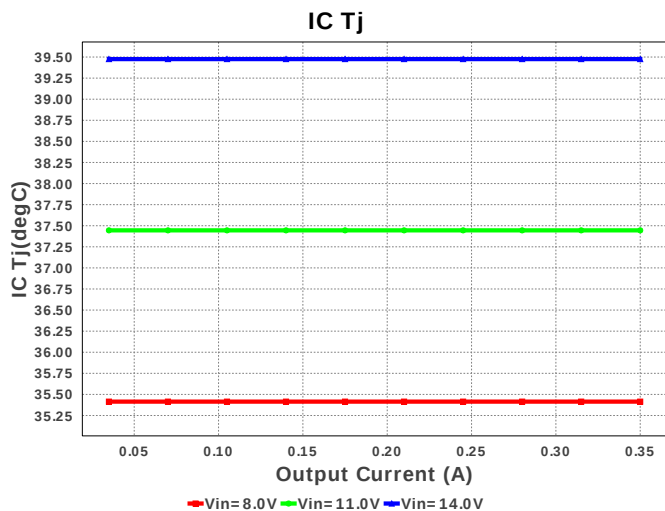
Electrical BOM

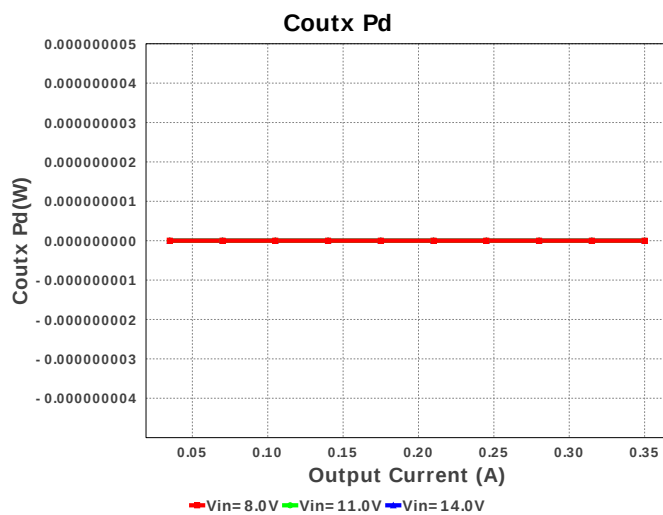
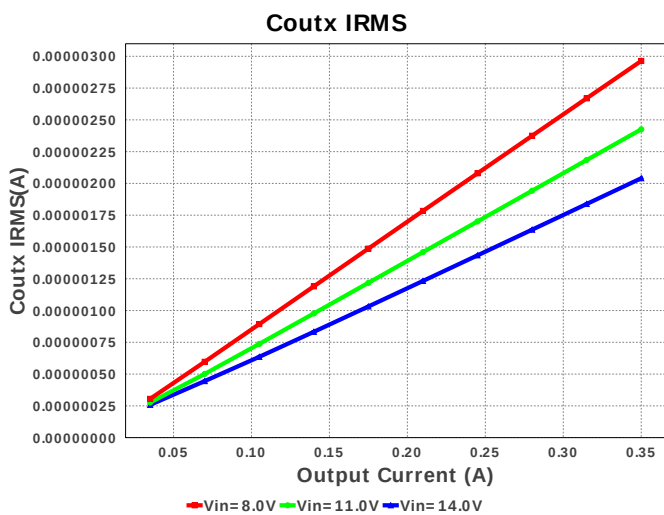
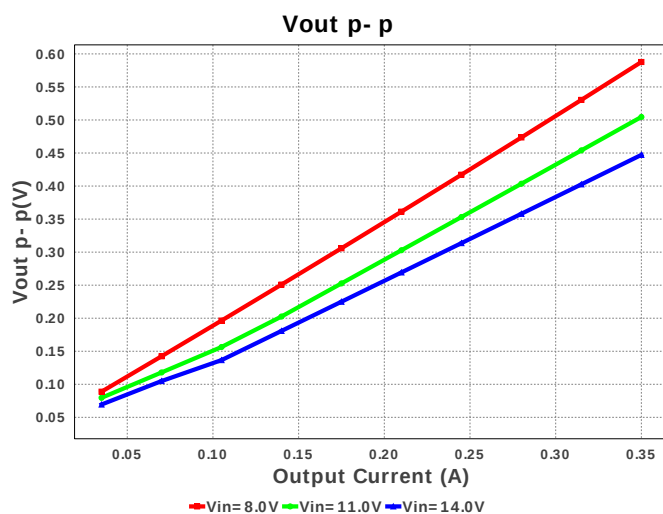
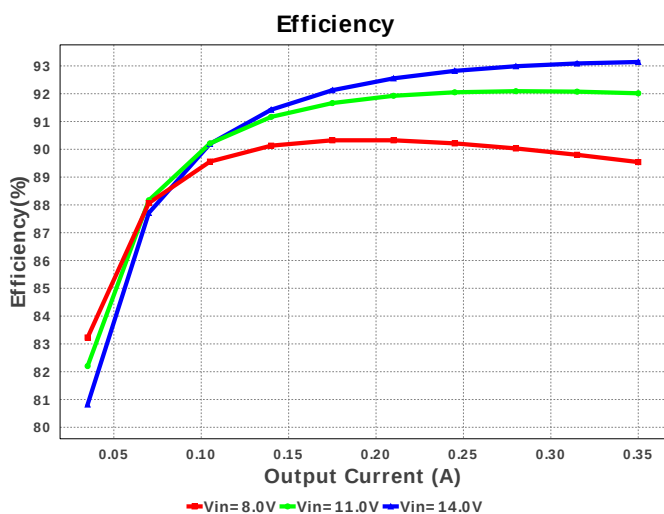
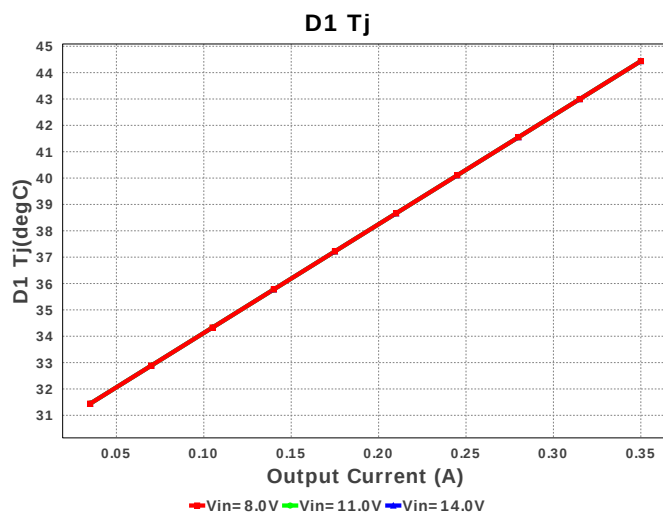
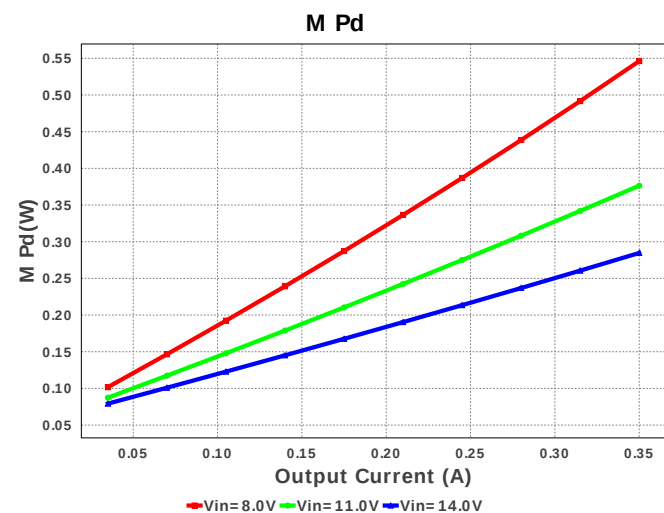
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbp	TDK	C1608X5R1C105K Series= 285	Cap= 1.0 μ F ESR= 5.713 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0603 5mm2
2.	Cbyp	Taiyo Yuden	EMK212B7474KD-T Series= X7R	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0805 7mm2
3.	Ccomp	Yageo America	CC0805KRX7R9BB472 Series= X7R	Cap= 4.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
4.	Ccomp2	Yageo America	CC0805JRNP09BN470 Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
5.	Ccft	Yageo America	CC0805JRNP09BN181 Series= C0G/NP0	Cap= 180.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
6.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 μ F ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	\$0.06	0805 7mm2
7.	Cout	Panasonic	EEV-FK1K151Q Series= FK	Cap= 150.0 μ F ESR= 320.0 mOhm VDC= 80.0 V IRMS= 500.0 mA	1	\$0.51	SM_RADIAL_H13 264mm2



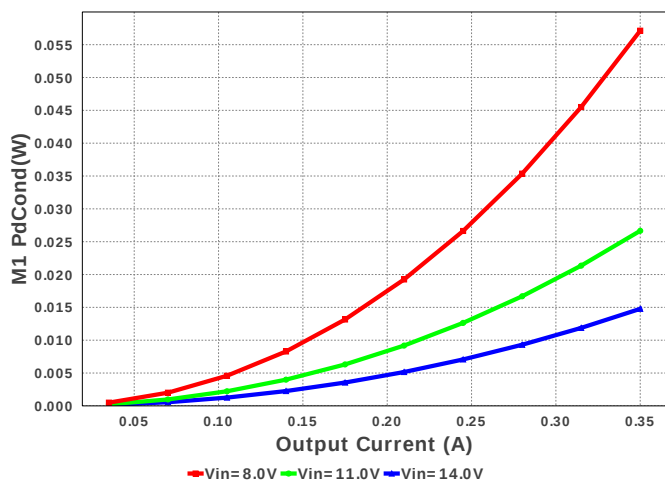
SM_RADIAL_H13 264mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Coutx	TDK	C3225X7S2A335K200AB Series= X7R	Cap= 3.3 μ F ESR= 5.46 mOhm VDC= 100.0 V IRMS= 7.036 A	2	\$0.24	 1210 15mm2
9.	Crc	Yageo America	CC0805JRNP09BN101 Series= C0G/NP0	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
10.	Css	MuRata	GRM155R61A274KE15D Series= X5R	Cap= 270.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.02	 0402 3mm2
11.	D1	Vishay-Semiconductor	SS36-E3/57T	VF@Io= 750.0 mV VRRM= 60.0 V	1	\$0.18	 SMC 83mm2
12.	L1	Bourns	SRR1210-680M	L= 68.0 μ H DCR= 100.0 mOhm	1	\$0.44	 SRR1210 196mm2
13.	M1	Texas Instruments	CSD18563Q5A	VdsMax= 60.0 V IdsMax= 100.0 Amps	1	\$0.68	 TRANS_NexFET_Q5A 55mm2
14.	Rcomp	Vishay-Dale	CRCW0402107KFKED Series= CRCW..e3	Res= 107.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
15.	Rfb1	Vishay-Dale	CRCW04021K02FKED Series= CRCW..e3	Res= 1.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
16.	Rfb2	Vishay-Dale	CRCW040251K1FKED Series= CRCW..e3	Res= 51.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
17.	Rg	Vishay-Dale	CRCW04027R15FKED Series= CRCW..e3	Res= 7.15 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
18.	Rift	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
19.	Rrc	Vishay-Dale	CRCW0402309KFKED Series= CRCW..e3	Res= 309.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
20.	Rsense	Panasonic	ERJ-L14KF39MU Series= 232	Res= 39.0 mOhm Power= 330.0 mW Tolerance= 1.0%	1	\$0.11	 1210 15mm2
21.	U1	Texas Instruments	TPS40210DGQR	Switcher	1	\$0.80	 S-PDSO-G10 24mm2

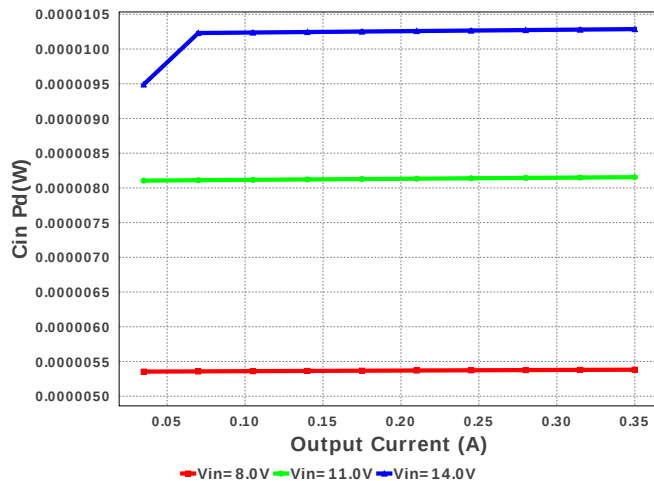




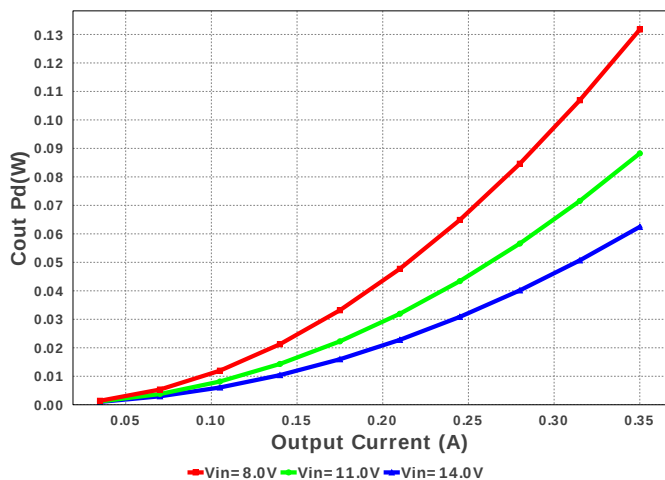
M1 PdCond



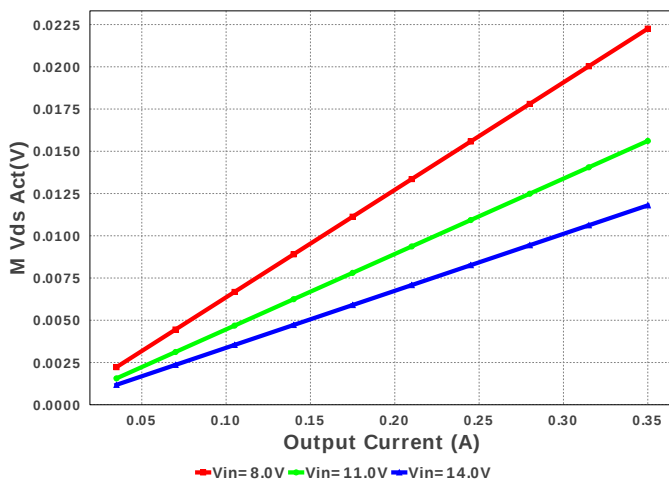
Cin Pd



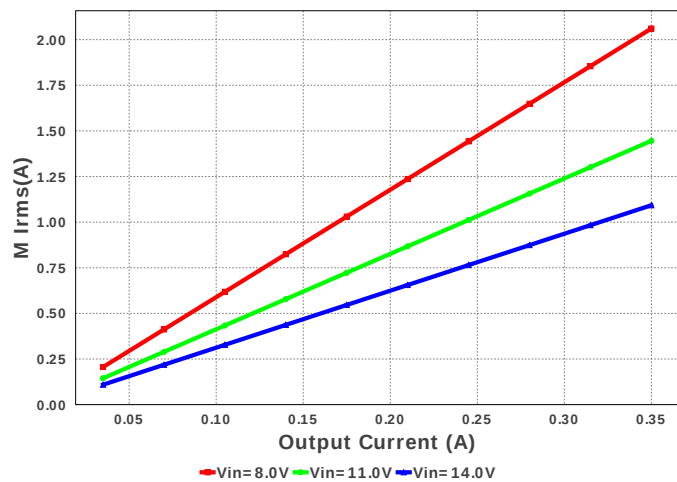
Cout Pd



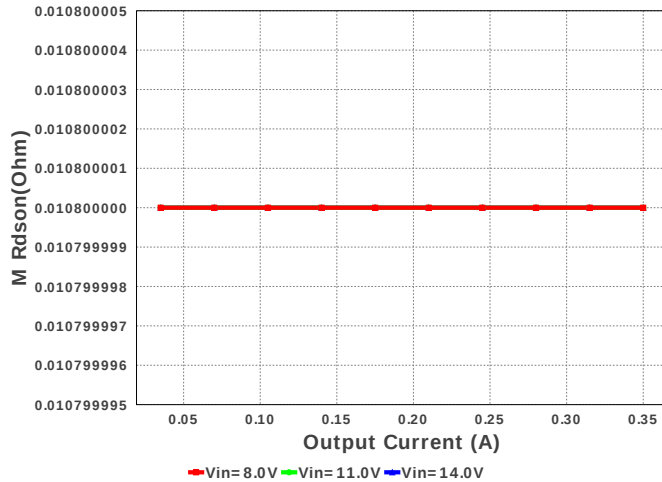
M Vds Act

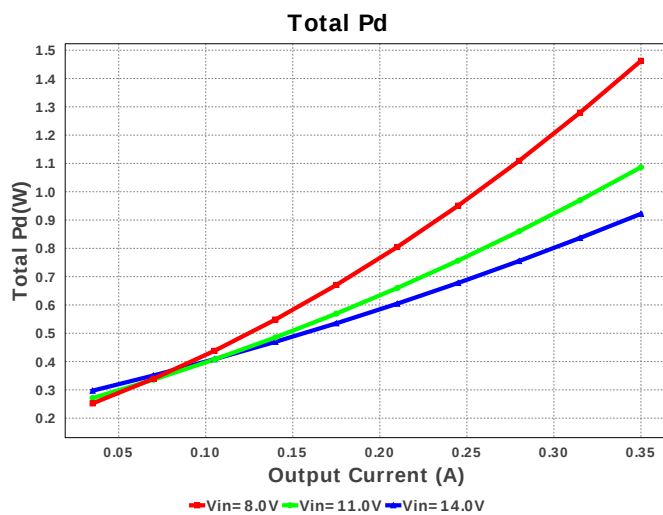
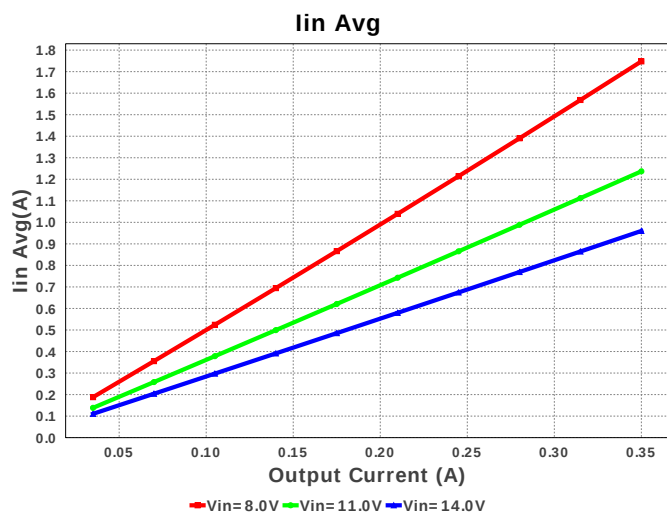
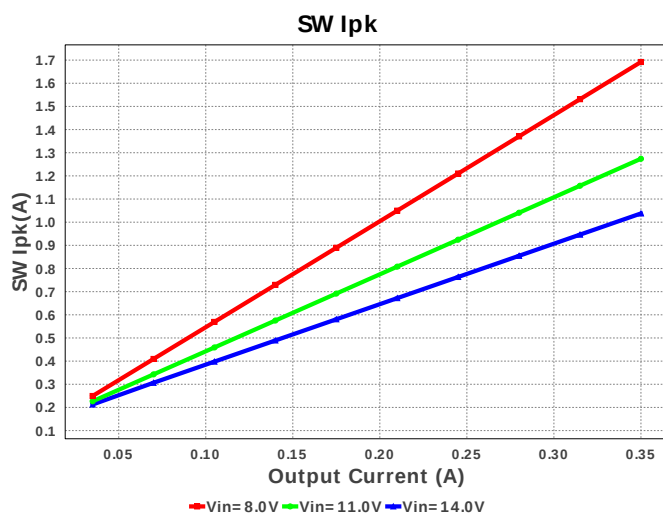
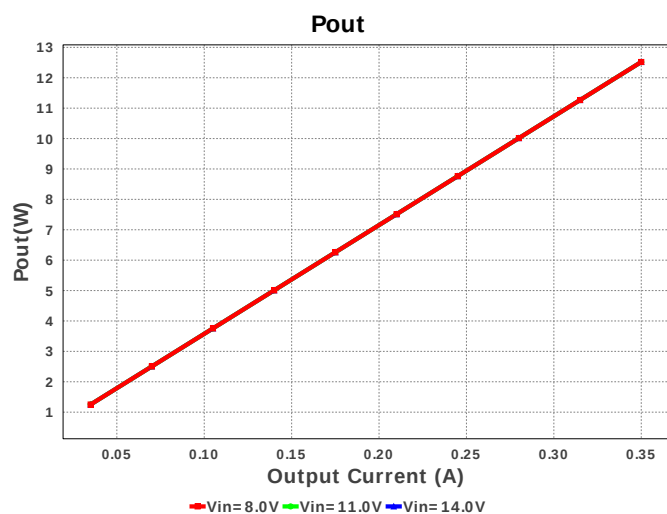
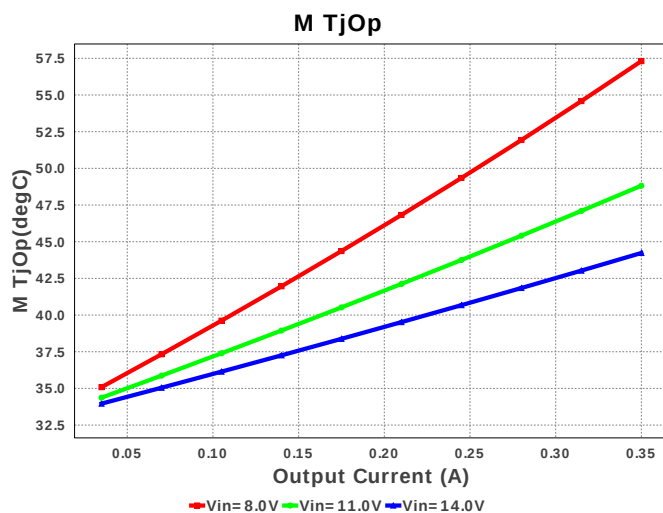
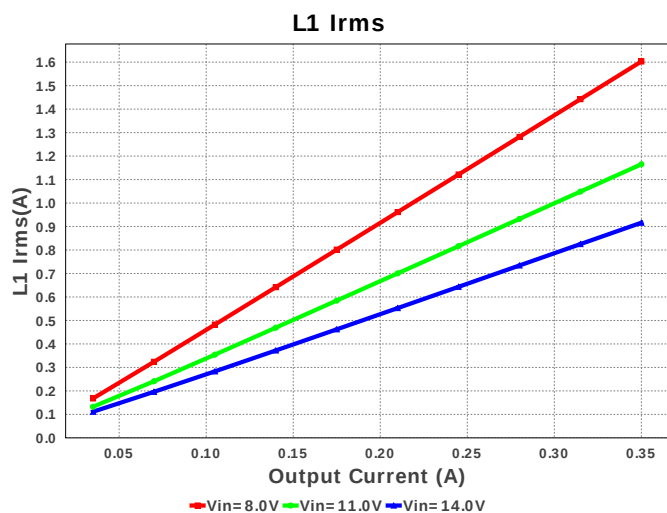


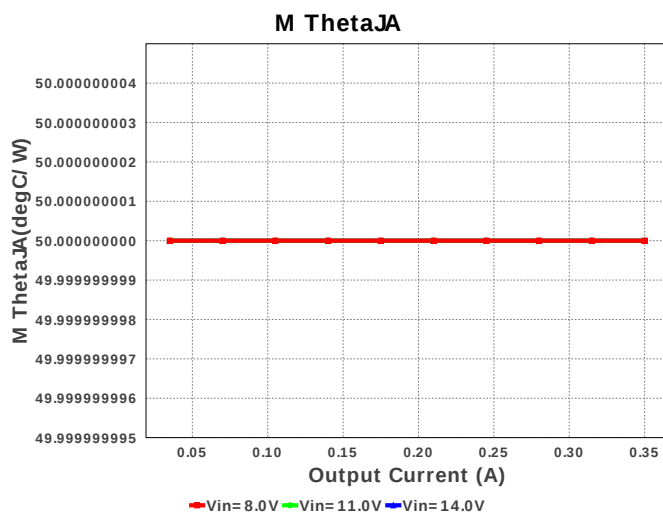
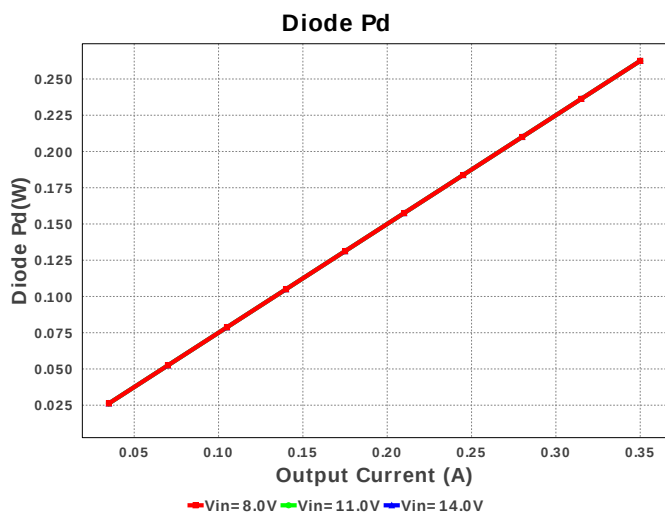
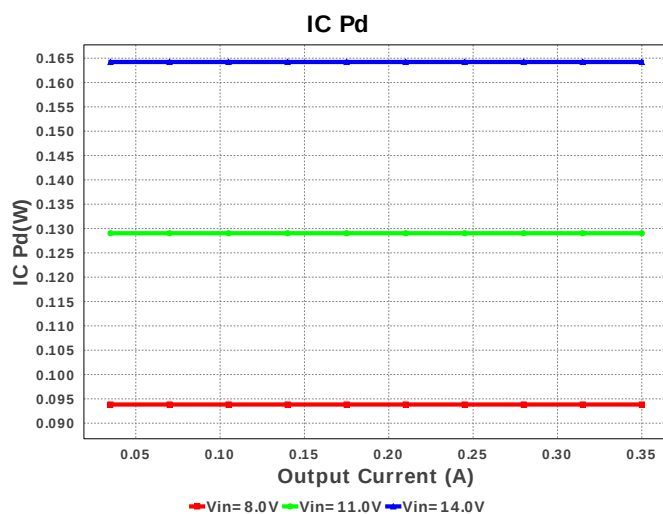
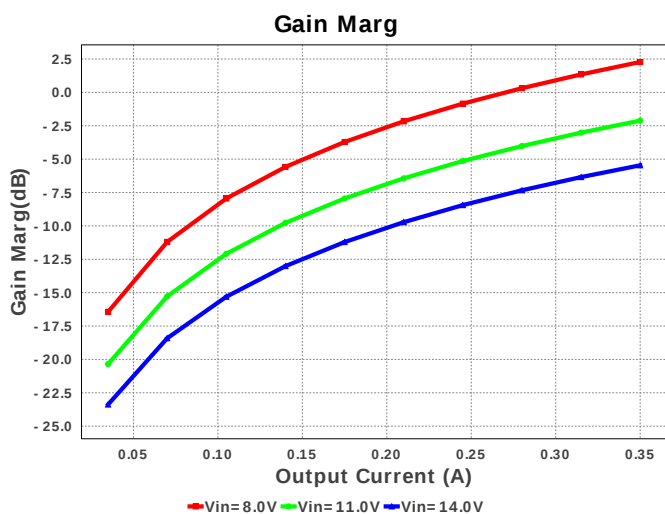
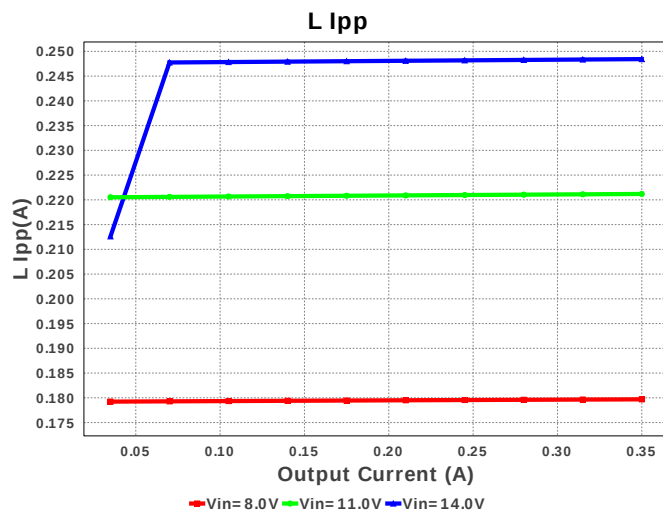
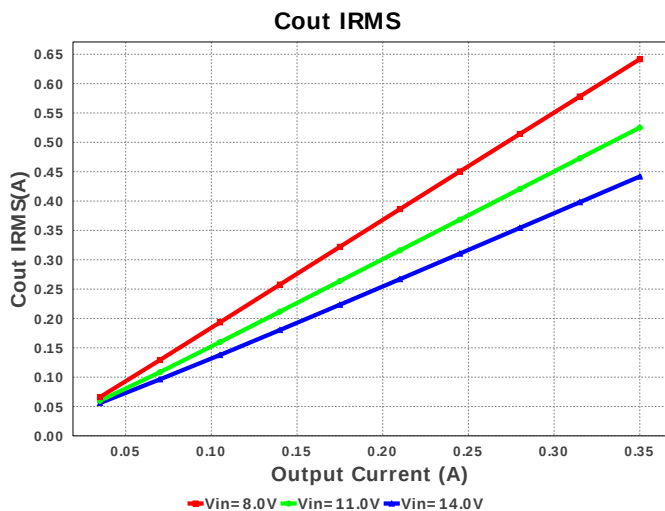
M Irms

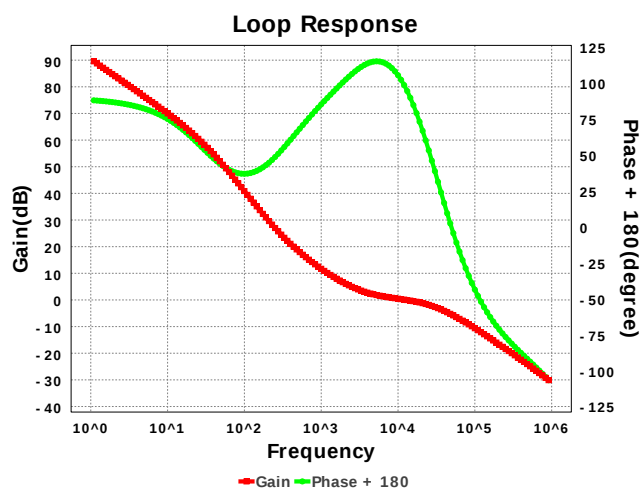
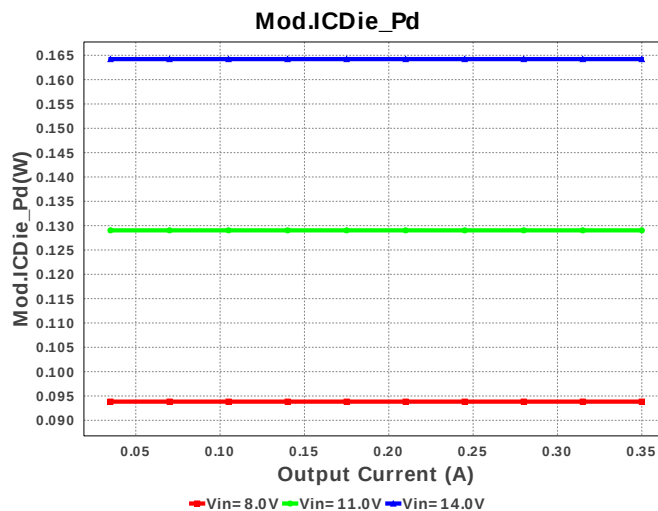
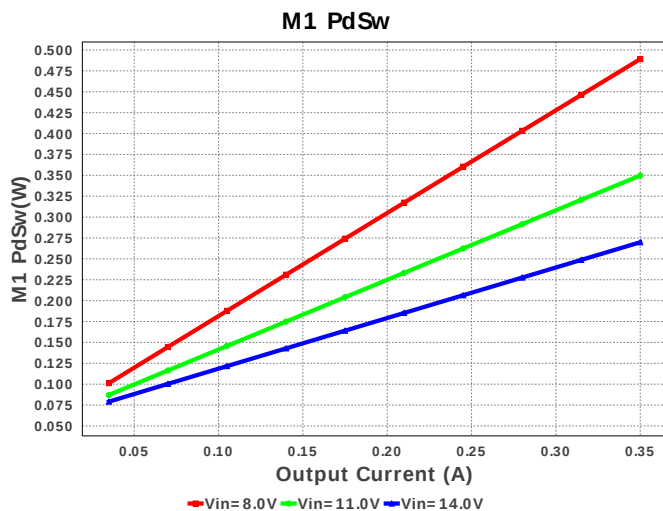


M Rdson









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	52.103 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	652.05 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	3.001 μ A	Current	Output capacitor_x RMS ripple current
4.	Iin Avg	1.69 A	Current	Average input current
5.	L Ipp	180.491 mA	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	1.609 A	Current	Inductor ripple current
7.	M Irms	2.071 A	Current	MOSFET RMS ripple current
8.	SW Ipk	1.698 A	Current	Peak switch current
9.	BOM Count	22	General	Total Design BOM count
10.	FootPrint	732.0 mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	512.777 kHz	General	Switching frequency
12.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
13.	M Rdsn	10.8 mOhm	General	Drain-Source On-resistance
14.	M Vds Act	22.367 mV	General	M Vds
15.	Pout	12.6 W	General	Total output power
16.	Total BOM	\$3.41	General	Total BOM Cost
17.	D1 Tj	44.438 degC	Op_Point	D1 junction temperature
18.	Vout OP	35.769 V	Op_Point	Operational Output Voltage
19.	Cross Freq	2.667 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	79.282 %	Op_point	Duty cycle
21.	Efficiency	93.218 %	Op_point	Steady state efficiency
22.	Gain Marg	1.993 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	35.454 degC	Op_point	IC junction temperature
24.	ICThetaJA	57.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	350.0 mA	Op_point	Iout operating point
26.	M ThetaJA	50.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
27.	M TjOp	58.077 degC	Op_point	MOSFET junction temperature
28.	Phase Marg	100.55 deg	Op_point	Bode Plot Phase Margin
29.	VIN_OP	8.0 V	Op_point	Vin operating point
30.	Vout p-p	569.474 mV	Op_point	Peak-to-peak output ripple voltage
31.	Cin Pd	5.429 μ W	Power	Input capacitor power dissipation
32.	Cout Pd	136.054 mW	Power	Output capacitor power dissipation

#	Name	Value	Category	Description
33.	Coutx Pd	24.582 fW	Power	Output capacitor_x power loss
34.	Diode Pd	262.5 mW	Power	Diode power dissipation
35.	IC Pd	94.52 mW	Power	IC power dissipation
36.	L Pd	310.533 mW	Power	Inductor power dissipation
37.	M Pd	561.531 mW	Power	MOSFET power dissipation
38.	M1 PdCond	57.969 mW	Power	M1 MOSFET conduction losses
39.	M1 PdSw	503.562 mW	Power	M1 MOSFET switching losses
40.	Rfb Pd	24.866 mW	Power	Rfb Power Dissipation
41.	Total Pd	916.709 mW	Power	Total Power Dissipation
42.	Low Freq Gain	88.203 dB	Unknown	Gain at 10Hz

Design Inputs

#	Name	Value	Description
1.	Iout	350.0 mA	Maximum Output Current
2.	Iout1	350.0 mAmps	Output Current #1
3.	SoftStart	13.0 ms	Soft Start Time (ms)
4.	VinMax	14.0 V	Maximum input voltage
5.	VinMin	8.0 V	Minimum input voltage
6.	Vout	36.0 V	Output Voltage
7.	Vout1	36.0 Volt	Output Voltage #1
8.	base_pn	TPS40210	Texas Instruments Base Part Number
9.	source	DC	Input Source Type
10.	ta	30.0 degC	Ambient temperature
11.	userfsw	512.777 kHz	Customer Selected Frequency

Design Assistance

1. TPS40210 Product Folder : <http://www.ti.com/product/tps40210> : contains the data sheet and other resources.

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