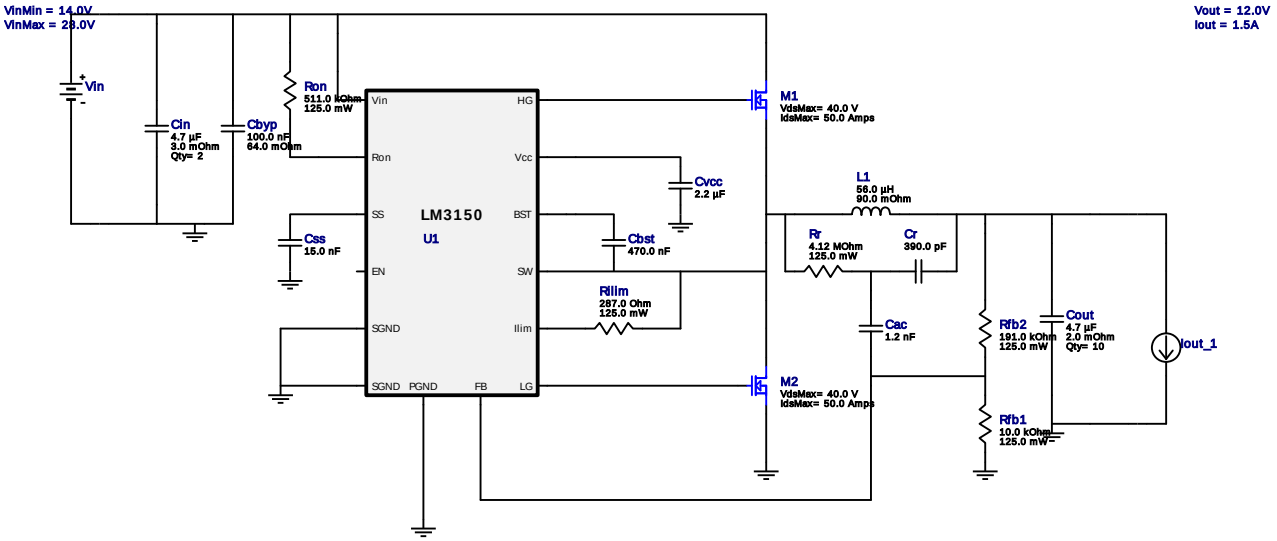
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 28.0V
Vout = 12.0V
Iout = 1.5A

Device = LM3150MH/NOPB
Topology = Buck
Created = 5/28/14 7:09:38 AM
BOM Cost = $4.05
Footprint = 529.0mm2
BOM Count = 27
Total Pd = 0.59W

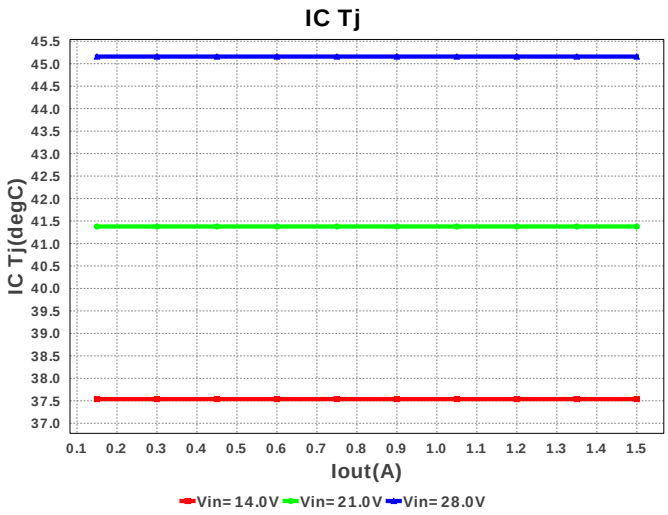
Design : 3588724/1554 LM3150MH/NOPB
LM3150MHX/NOPB 14.0V-28.0V to 12.0V @ 1.5A

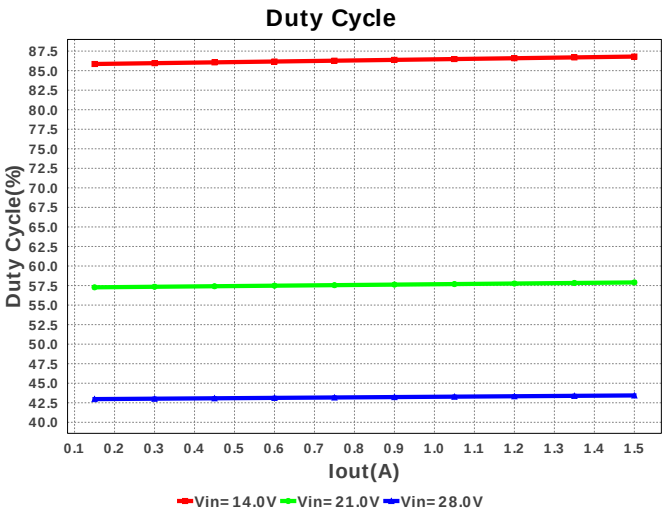


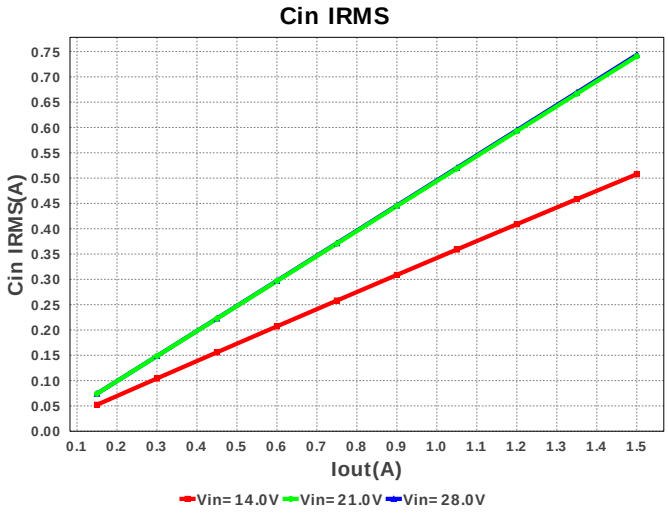
Electrical BOM

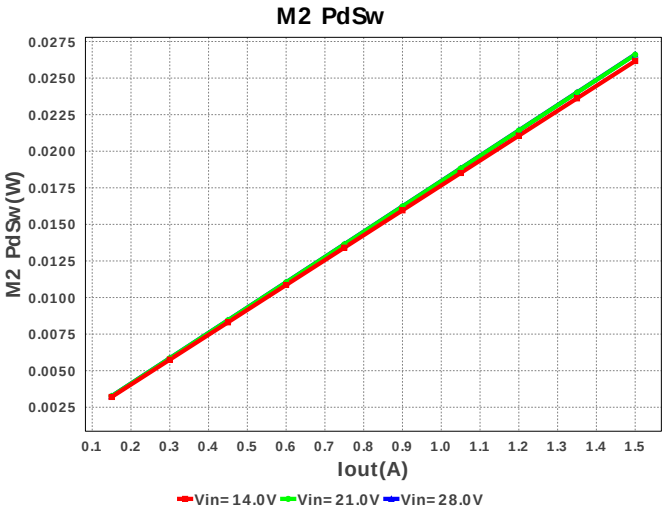
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cac	MuRata	GRM216R71E122KA01D Series= X7R	Cap= 1.2 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
2.	Cbst	Taiyo Yuden	EMK212B7474KD-T Series= X7R	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7mm2
3.	Cbyp	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7mm2
4.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 µF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	2	$0.10	1206 11mm2
5.	Cout	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 µF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	10	$0.06	0805 7mm2
6.	Cr	Yageo America	CC0805KRX7R9BB391 Series= X7R	Cap= 390.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
7.	Css	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
8.	Cvcc	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 µF VDC= 16.0 V IRMS= 0.0 A	1	$0.03	0805 7mm2
9.	L1	Bourns	SRR1210-560M	L= 56.0 µH DCR= 90.0 mOhm	1	$0.44	 SRR1210 196mm2

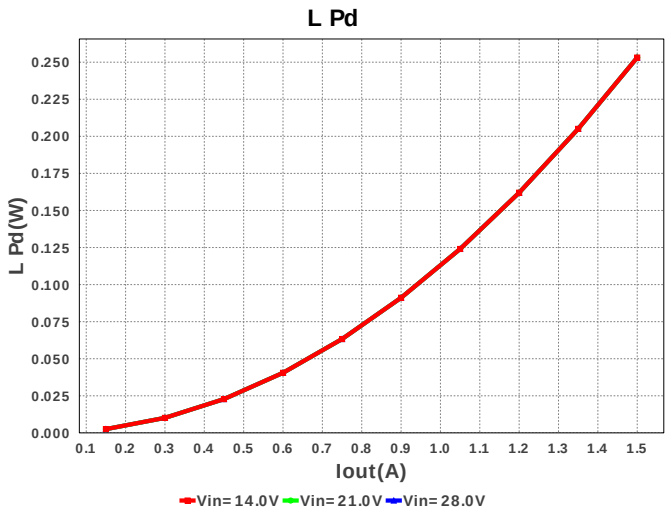
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	M1	Texas Instruments	CSD18504Q5A	VdsMax= 40.0 V IdsMax= 50.0 Amps	1	$0.56	 TRANS_NexFET_Q5A 55mm2
11.	M2	Texas Instruments	CSD18504Q5A	VdsMax= 40.0 V IdsMax= 50.0 Amps	1	$0.56	 TRANS_NexFET_Q5A 55mm2
12.	Rfb1	Panasonic	ERJ-6ENF1002V Series= 225	Res= 10.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
13.	Rfb2	Panasonic	ERJ-6ENF1913V Series= 225	Res= 191.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
14.	Rilim	Vishay-Dale	CRCW0805287RFKEA Series= CRCW..e3	Res= 287.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
15.	Ron	Panasonic	ERJ-6ENF5113V Series= 225	Res= 511.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
16.	Rr	Vishay-Dale	CRCW08054M12FKEA Series= CRCW..e3	Res= 4.12 MOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
17.	U1	Texas Instruments	LM3150MHX/NOPB	Switcher	1	$1.55	 MXA14A 59mm2

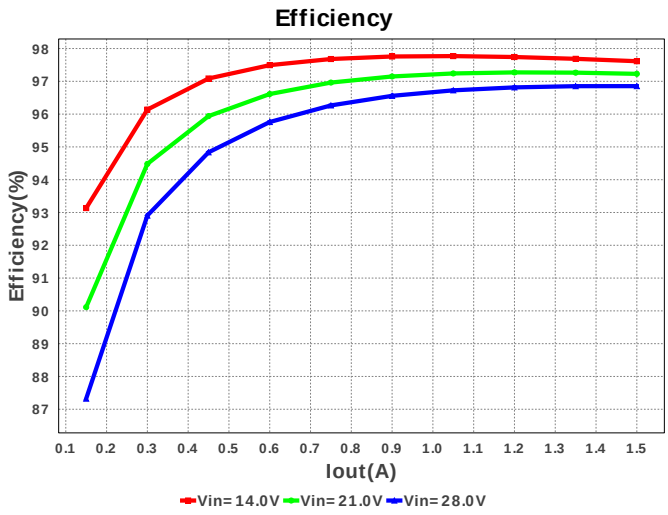


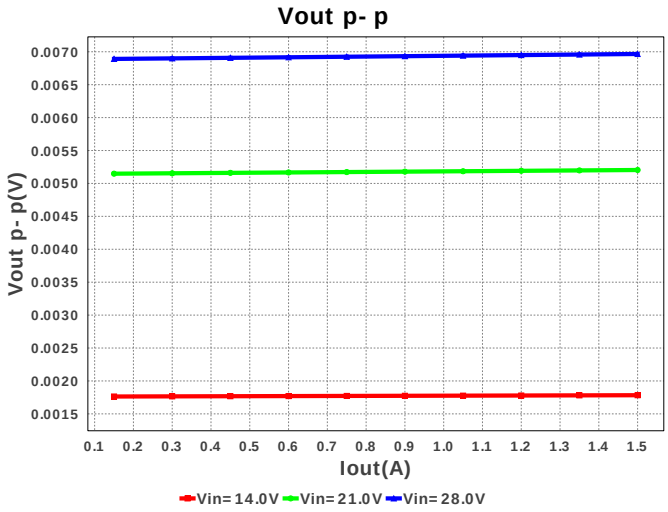


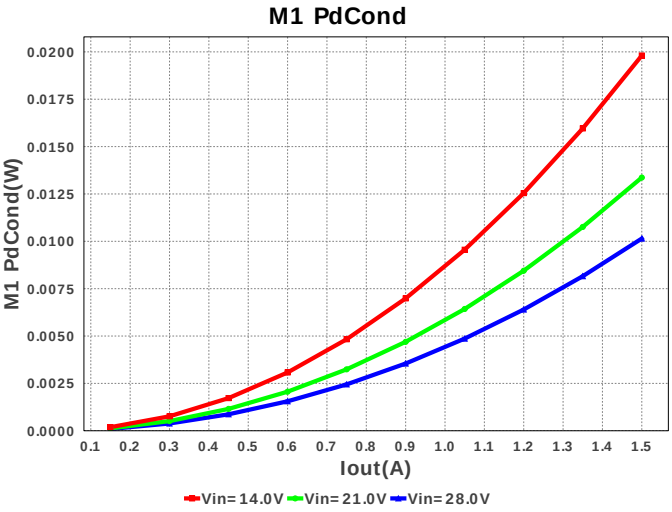


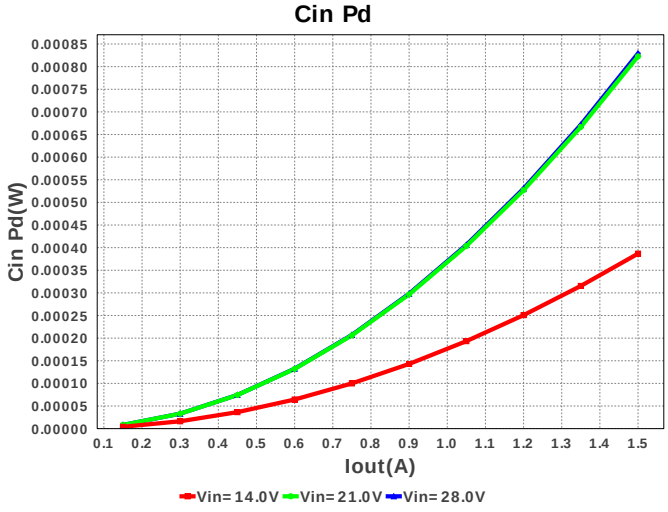


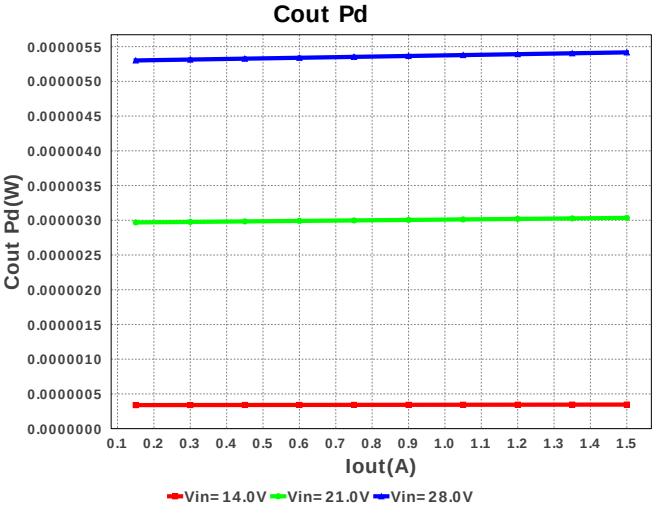


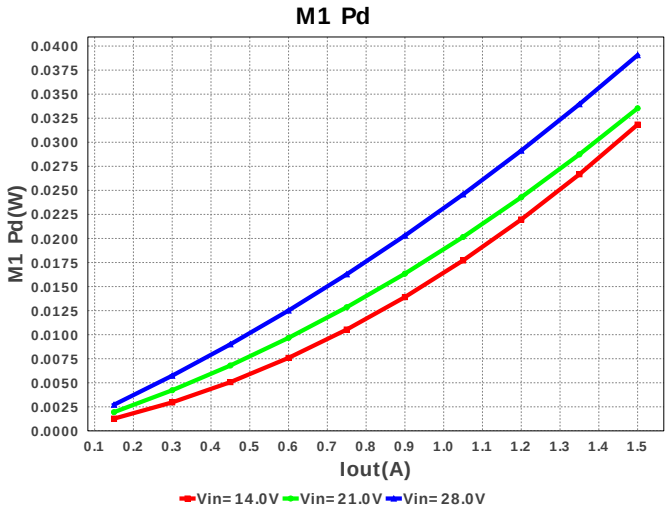


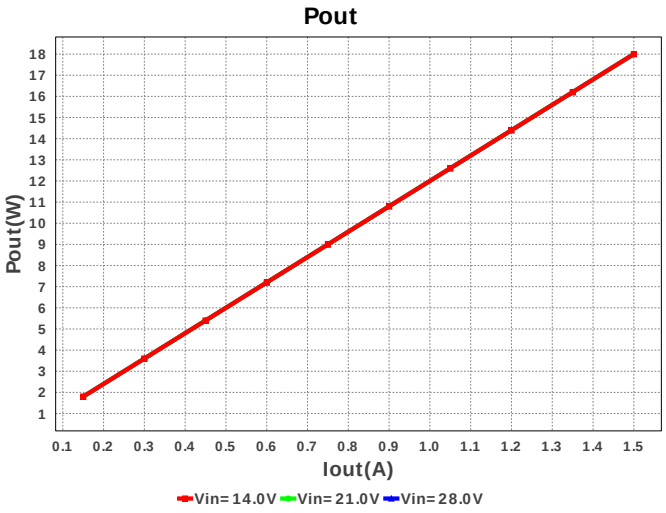


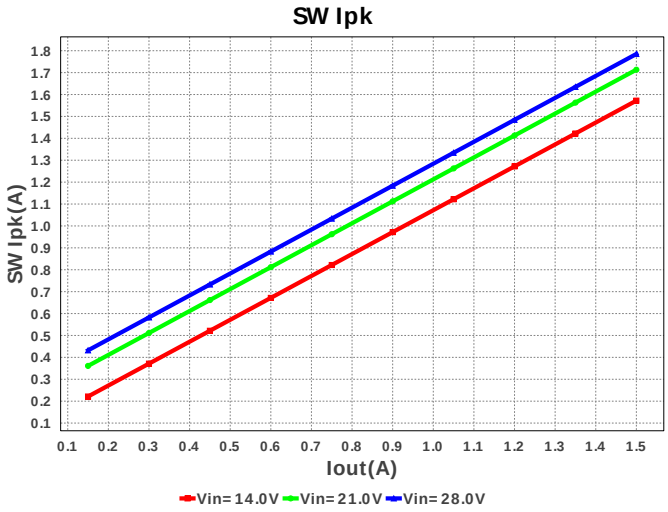


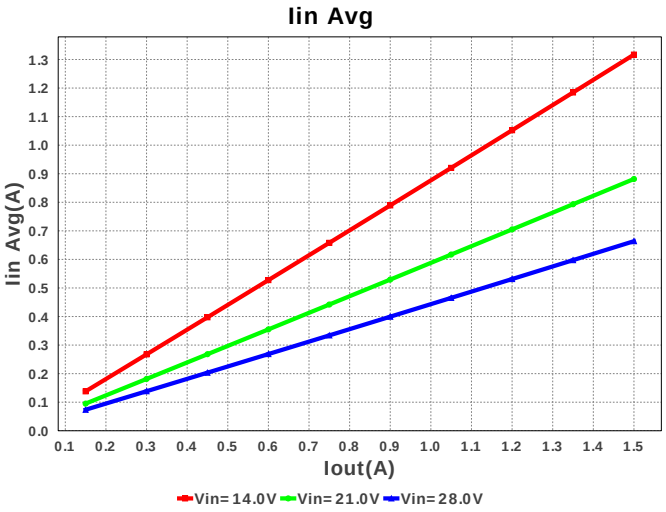


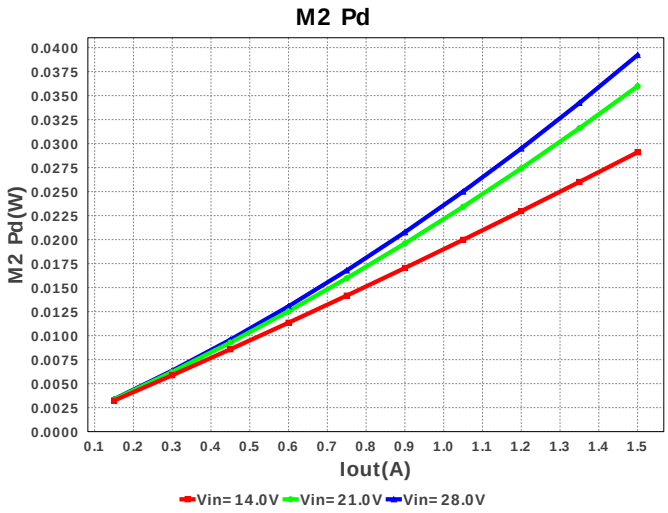


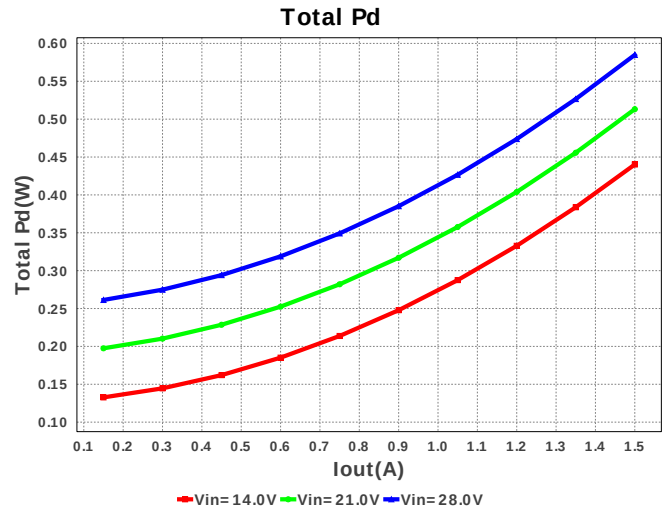


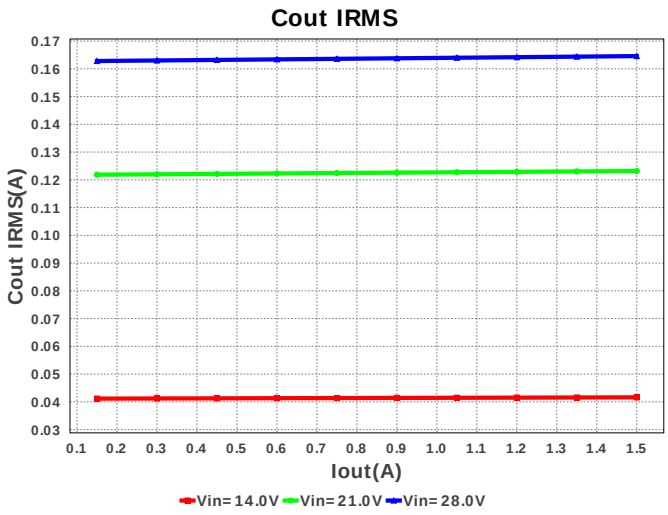


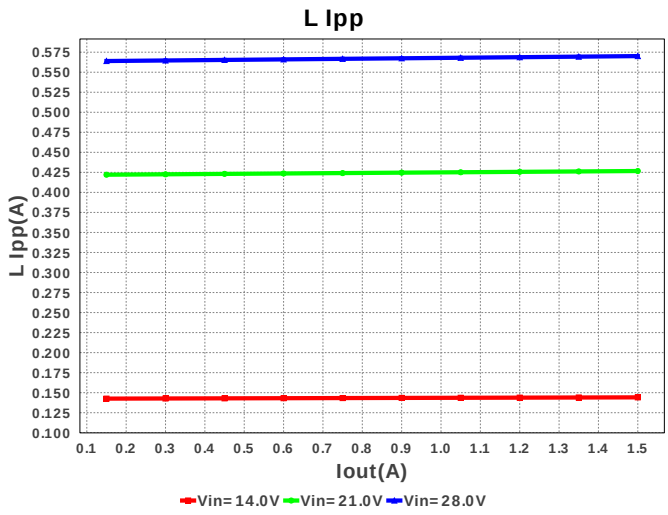


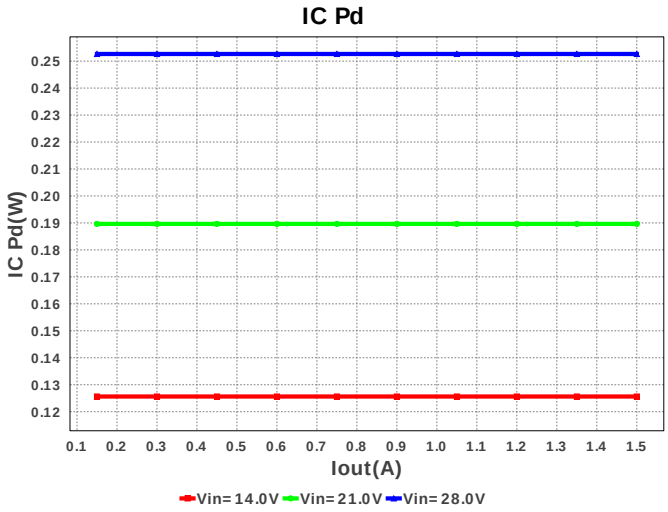


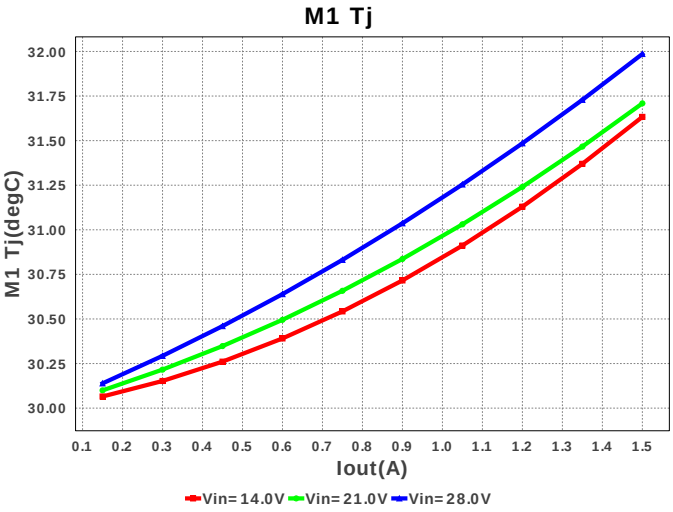


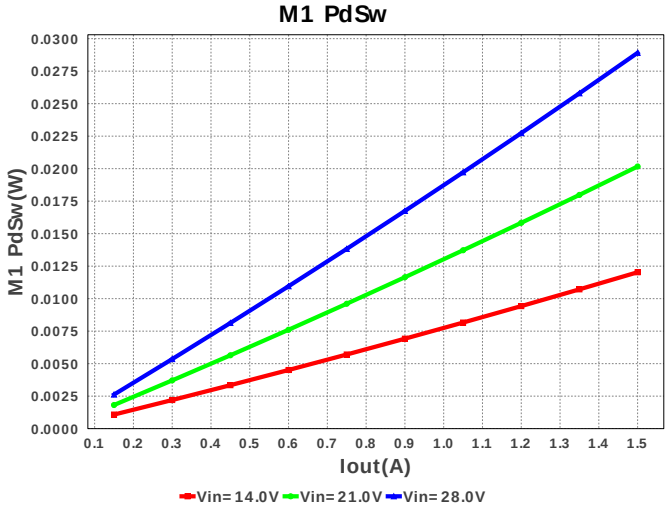


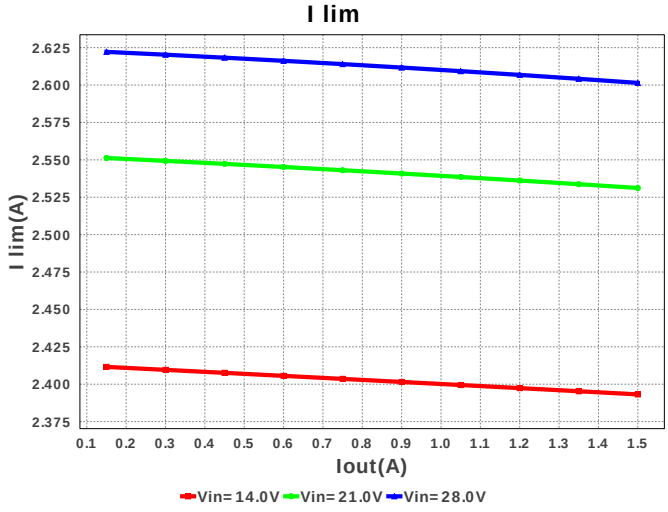


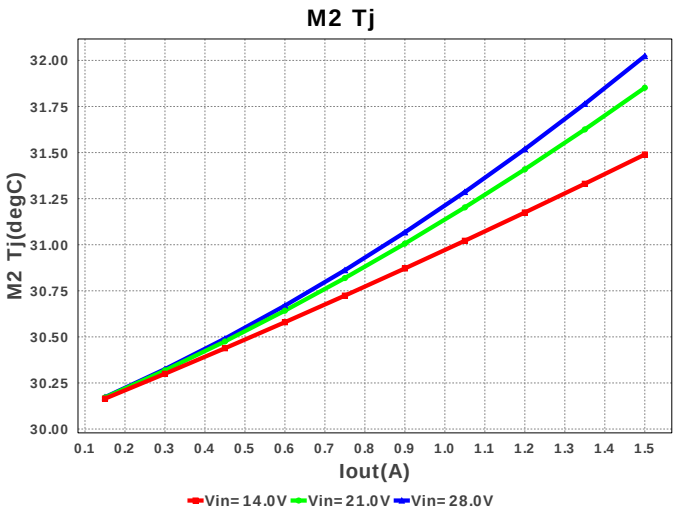


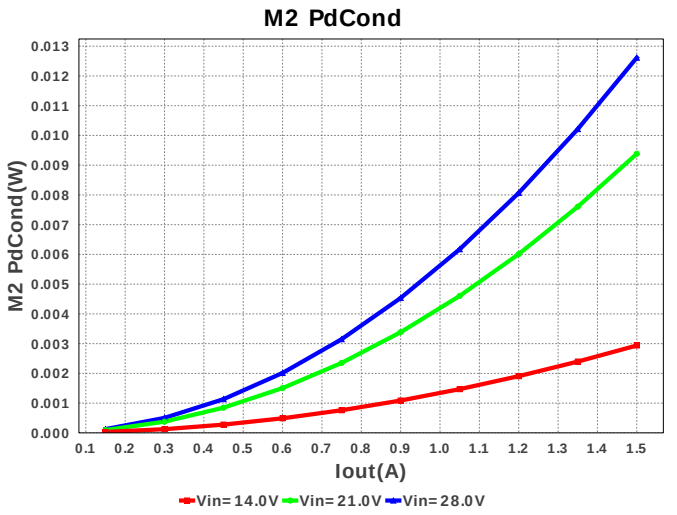












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	743.516 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	164.58 mA	Current	Output capacitor RMS ripple current
3.	I lim	2.601 A	Current	Current limit threshold
4.	Iin Avg	663.75 mA	Current	Average input current
5.	L Ipp	570.123 mA	Current	Peak-to-peak inductor ripple current
6.	SW Ipk	1.785 A	Current	Peak switch current
7.	BOM Count	27	General	Total Design BOM count
8.	FootPrint	529.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	217.694 kHz	General	Switching frequency
10.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
11.	Pout	18.0 W	General	Total output power
12.	Total BOM	$4.05	General	Total BOM Cost
13.	Duty Cycle	43.439 %	Op_point	Duty cycle
14.	Efficiency	96.852 %	Op_point	Steady state efficiency
15.	IC Tj	46.422 degC	Op_point	IC junction temperature
16.	IOUT_OP	1.5 A	Op_point	Iout operating point
17.	M1 Tj	31.986 degC	Op_point	M1 MOSFET junction temperature
18.	M2 Tj	32.03 degC	Op_point	M2 MOSFET junction temperature
19.	VIN_OP	28.0 V	Op_point	Vin operating point
20.	Vout p-p	6.966 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	829.223 µW	Power	Input capacitor power dissipation
22.	Cout Pd	5.417 µW	Power	Output capacitor power dissipation
23.	IC Pd	252.644 mW	Power	IC power dissipation
24.	L Pd	253.125 mW	Power	Inductor power dissipation
25.	M1 Pd	39.058 mW	Power	M1 MOSFET total power dissipation
26.	M1 PdCond	10.148 mW	Power	M1 MOSFET conduction losses
27.	M1 PdSw	28.91 mW	Power	M1 MOSFET switching losses
28.	M2 Pd	39.364 mW	Power	M2 MOSFET total power dissipation
29.	M2 PdCond	12.615 mW	Power	M2 MOSFET conduction losses
30.	M2 PdSw	26.75 mW	Power	M2 MOSFET switching losses
31.	Total Pd	585.056 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.5 A	Maximum Output Current
2.	Iout1	1.5 Amps	Output Current #1
3.	VinMax	28.0 V	Maximum input voltage
4.	VinMin	14.0 V	Minimum input voltage
5.	Vout	12.0 V	Output Voltage
6.	Vout1	12.0 Volt	Output Voltage #1
7.	base_pn	LM3150	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM3150** Product Folder : http://www.ti.com/product/lm3150 : contains the data sheet and other resources.