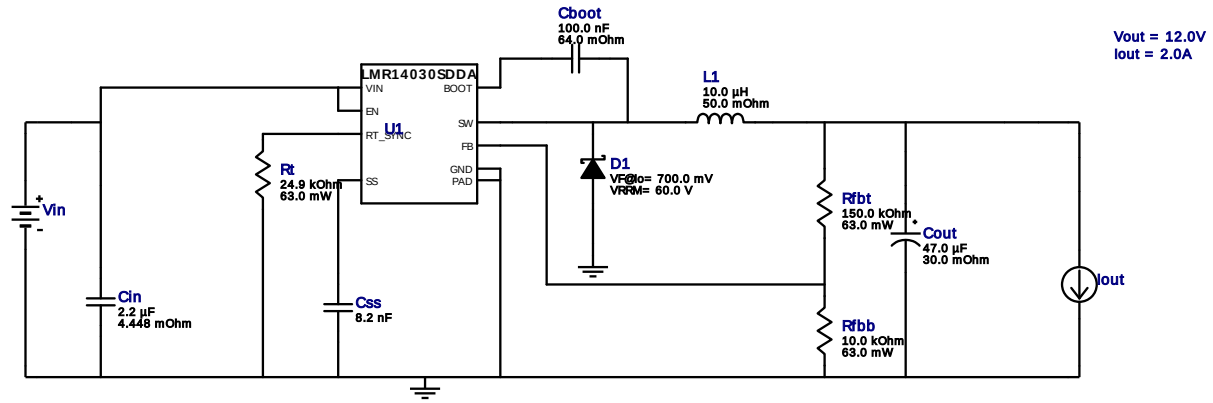
WEBENCH® Design Report

VinMin = 23.2V
VinMax = 29.4V
Vout = 12.0V
Iout = 2.0A

Device = LMR14030SDDAR
Topology = Buck
Created = 7/12/16 7:48:32 PM
BOM Cost = $2.52
BOM Count = 10
Total Pd = 1.78W

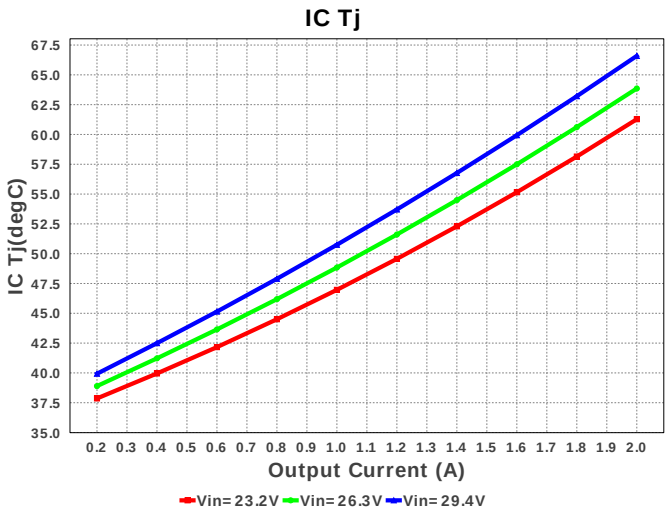
Design : 4738396/4 LMR14030SDDAR
LMR14030SDDAR 23.2V-29.4V to 12.00V @ 2.0002249999999995A

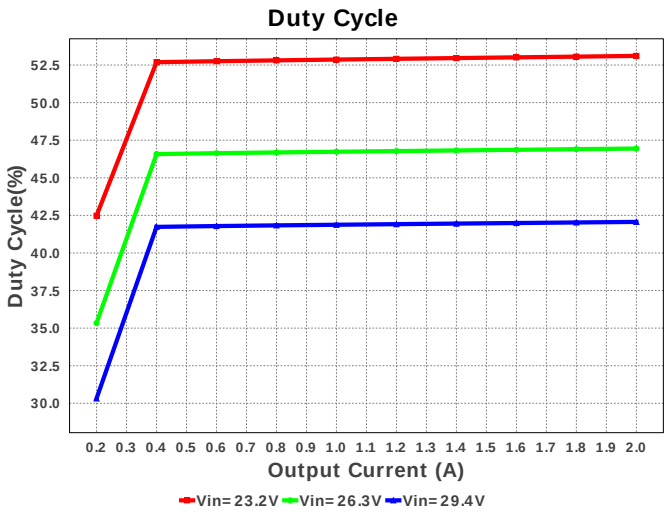


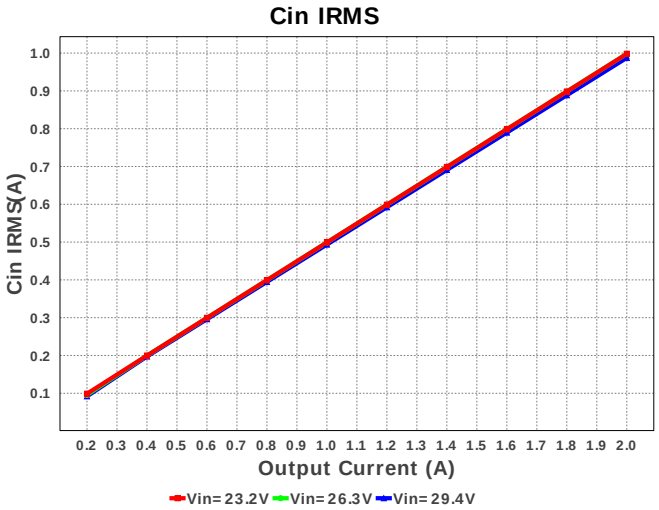
Electrical BOM

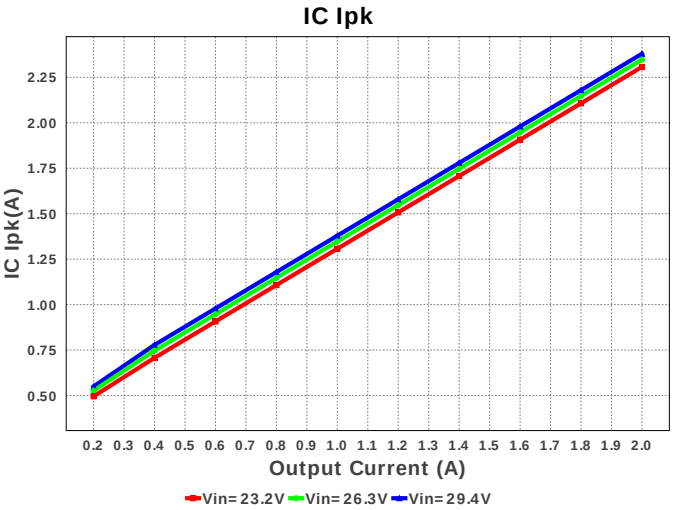
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
3.	Cout	Panasonic	25SVPF47M Series= ?	Cap= 47.0 uF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 2.8 A	1	$0.43	CAPSMT_62_F61 74 mm²
4.	Css	MuRata	GRM155R71C822KA01D Series= X7R	Cap= 8.2 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
5.	D1	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.09	SMA 37 mm²
6.	L1	Bourns	SRN8040-100M	L= 10.0 µH DCR= 50.0 mOhm	1	$0.22	SRN8040 100 mm²
7.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfbt	Vishay-Dale	CRCW0402150KFKED Series= CRCW..e3	Res= 150.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rt	Vishay-Dale	CRCW040224K9FKED Series= CRCW..e3	Res= 24.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

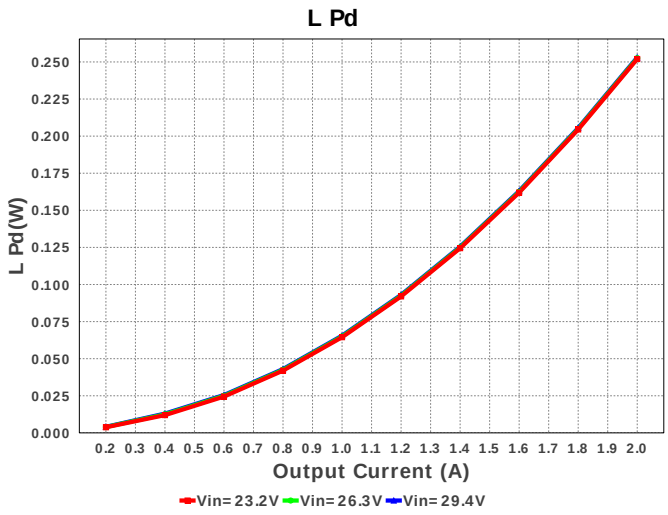
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14030SDDAR	Switcher	1	$1.68	DDA0008E_N 57 mm²

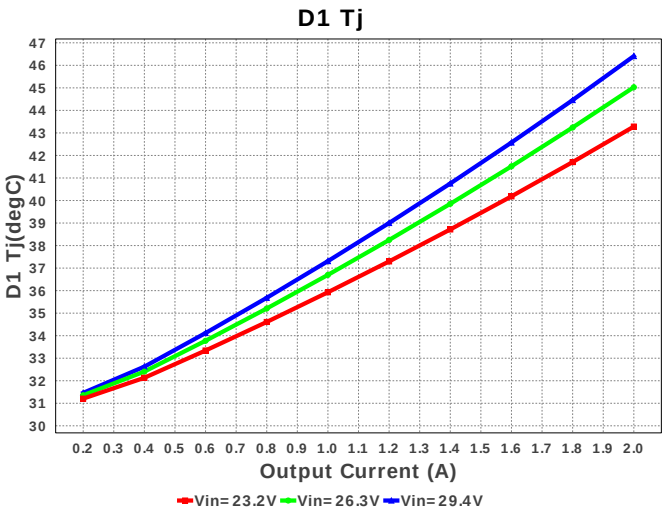


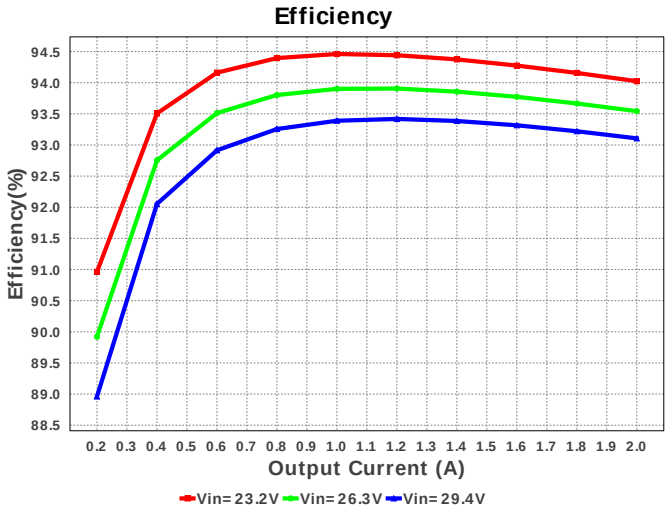


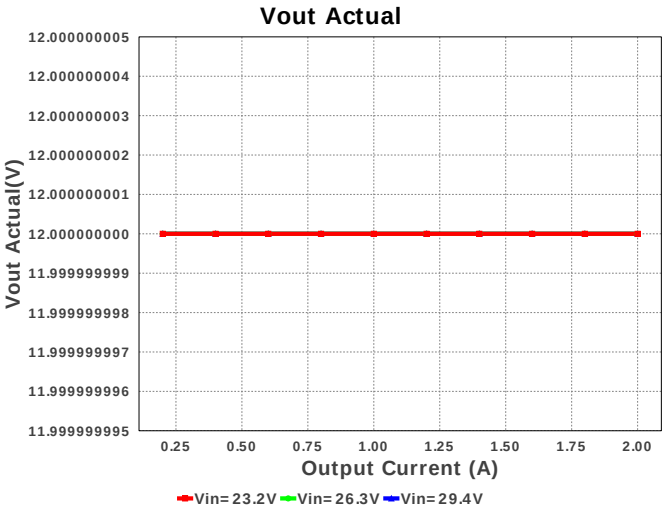


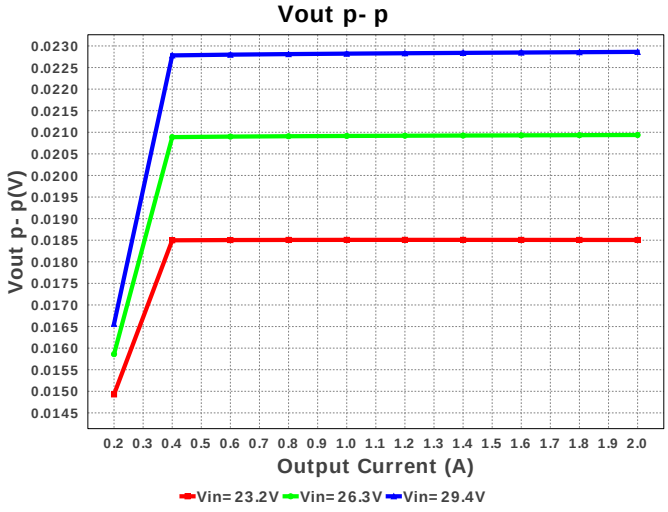


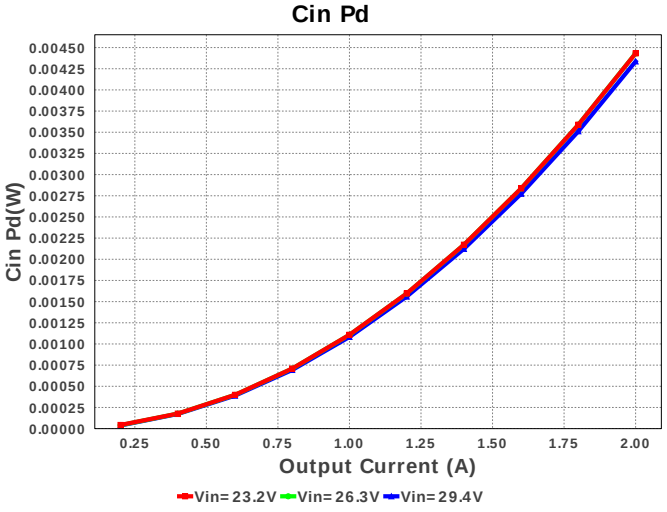


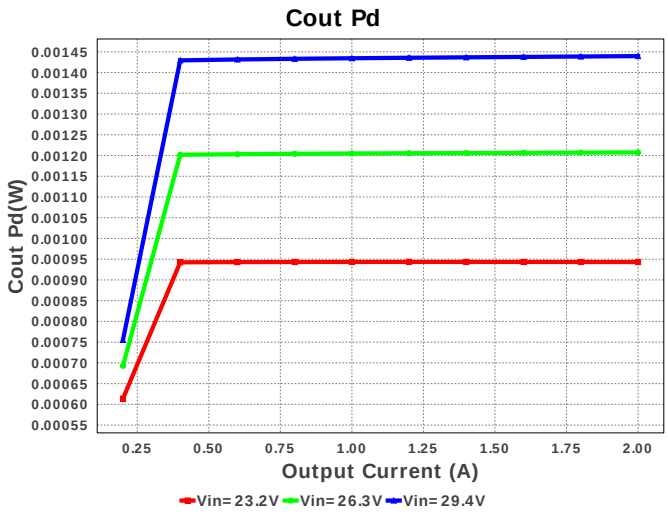


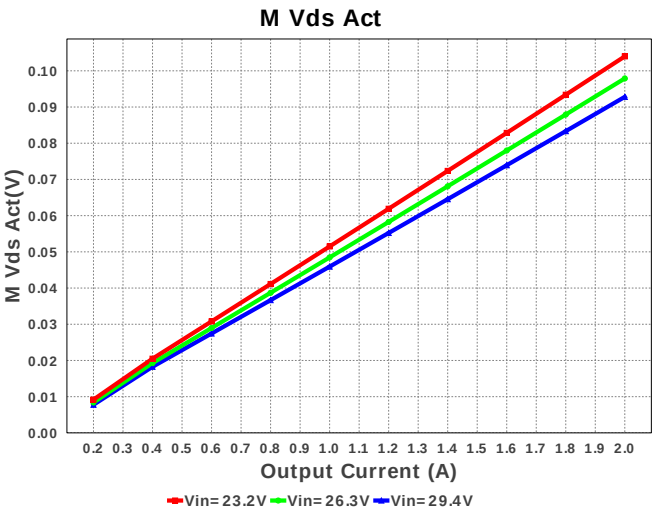


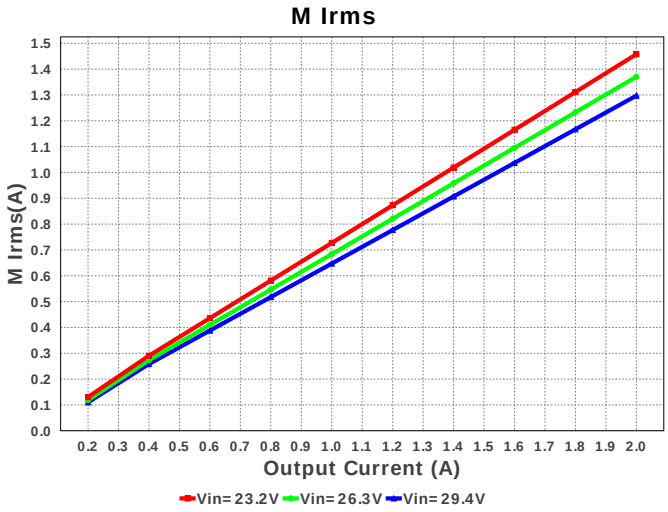


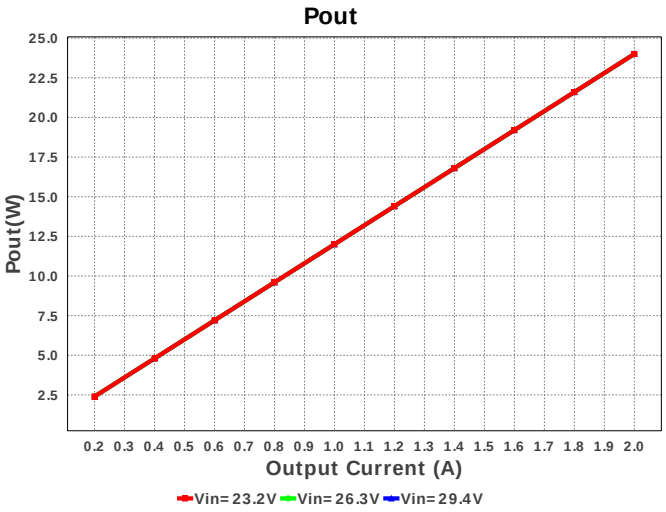


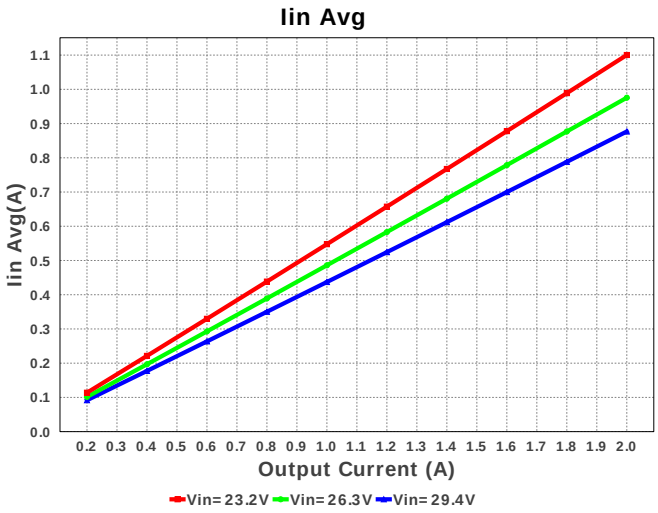


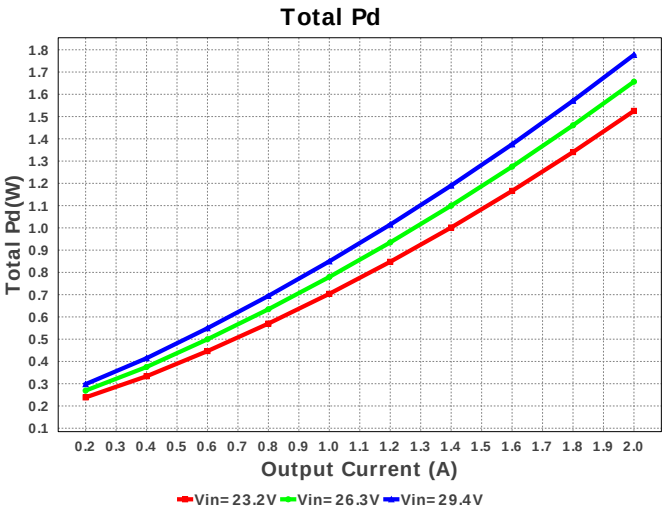


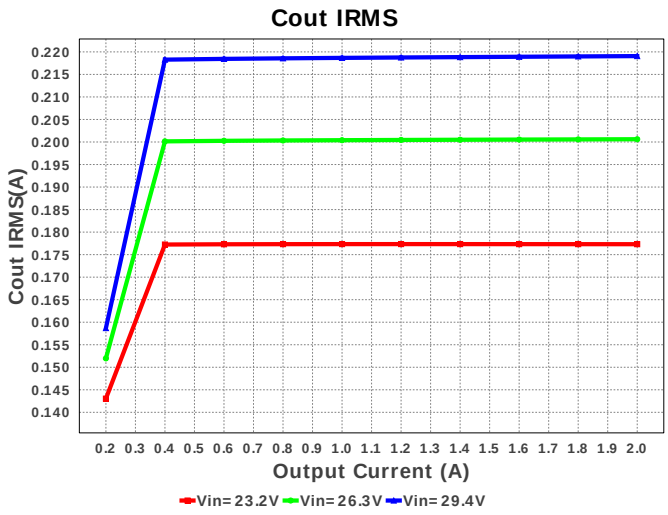


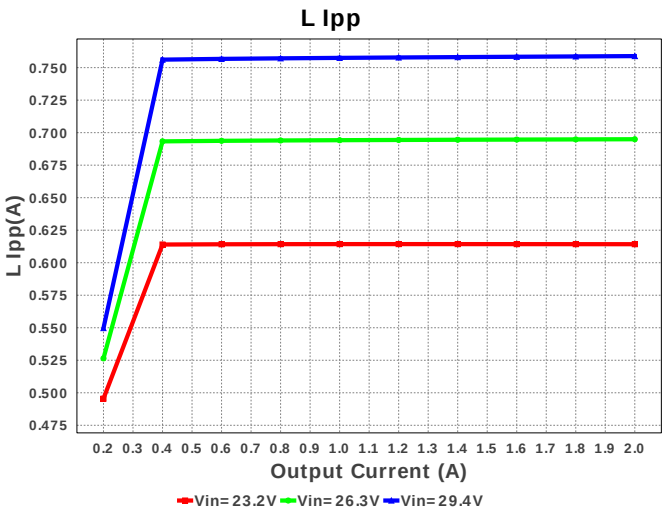


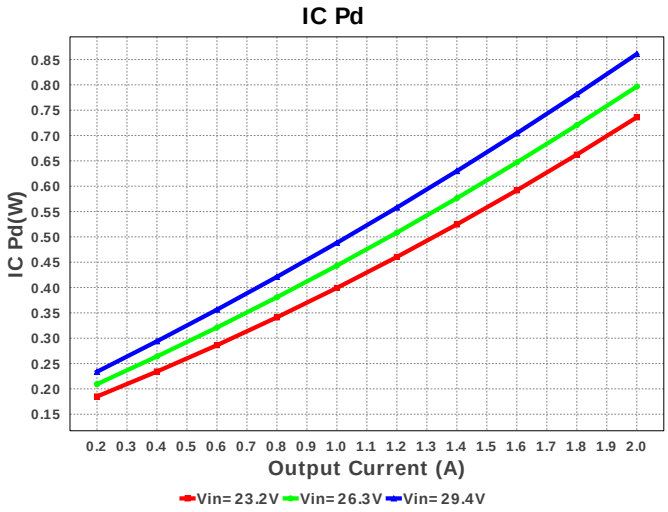


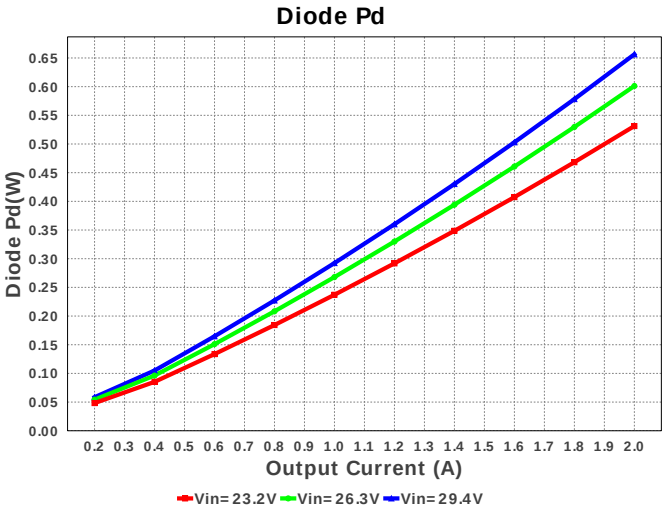


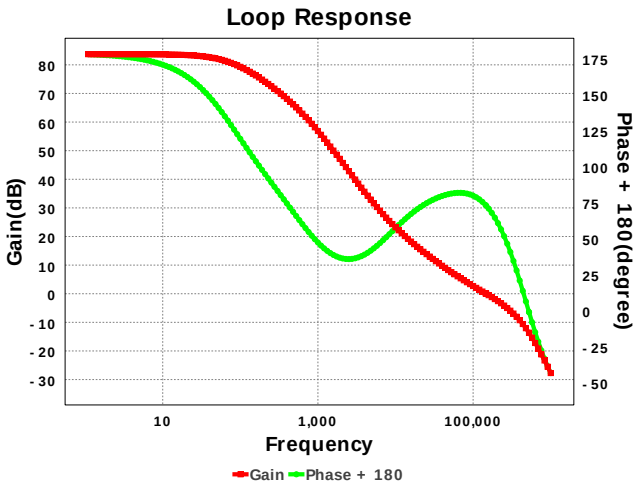












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	987.365 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	219.065 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.38 A	Current	Peak switch current in IC
4.	Iin Avg	876.8 mA	Current	Average input current
5.	L Ipp	758.86 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.297 A	Current	Q Iavg
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	298.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	959.376 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	92.78 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	24.0 W	General	Total output power
13.	Total BOM	$2.52	General	Total BOM Cost
14.	D1 Tj	46.41 degC	Op_Point	D1 junction temperature
15.	Vout Actual	12.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	147.402 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	42.065 %	Op_point	Duty cycle
19.	Efficiency	93.107 %	Op_point	Steady state efficiency
20.	IC Tj	66.157 degC	Op_point	IC junction temperature
21.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	2.0 A	Op_point	Iout operating point
23.	Phase Marg	73.954 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	29.4 V	Op_point	Vin operating point
25.	Vout p-p	22.863 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	4.336 mW	Power	Input capacitor power dissipation
27.	Cout Pd	1.44 mW	Power	Output capacitor power dissipation
28.	Diode Pd	656.404 mW	Power	Diode power dissipation
29.	IC Pd	860.888 mW	Power	IC power dissipation
30.	L Pd	253.018 mW	Power	Inductor power dissipation
31.	Total Pd	1.777 W	Power	Total Power Dissipation
32.	Vout Tolerance	4.339 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	29.4	Maximum input voltage
3.	VinMin	23.2	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	LMR14030S	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR14030S** Product Folder : http://www.ti.com/product/LMR14030 : contains the data sheet and other resources.