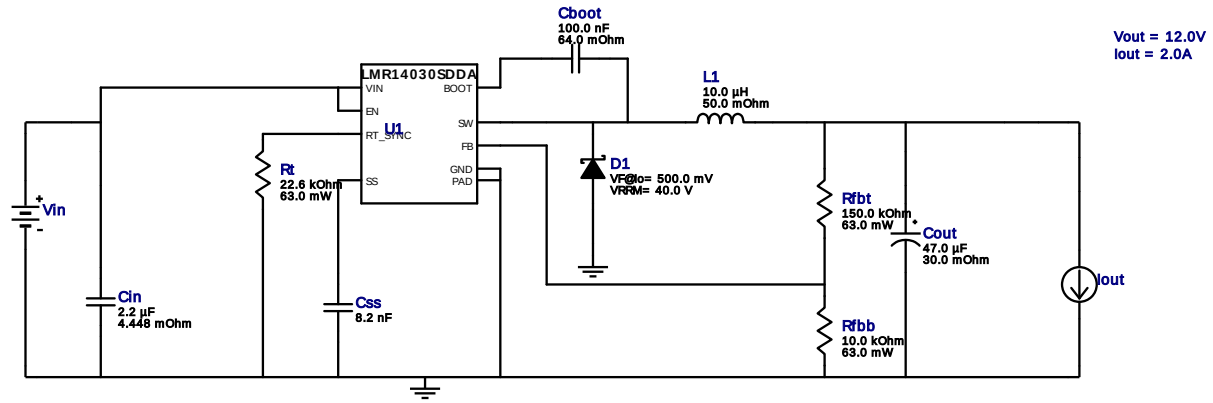
WEBENCH® Design Report

VinMin = 24.0V
VinMax = 26.0V
Vout = 12.0V
Iout = 2.0A

Device = LMR14030SDDAR
Topology = Buck
Created = 8/17/16 1:16:08 AM
BOM Cost = $2.52
BOM Count = 10
Total Pd = 1.54W

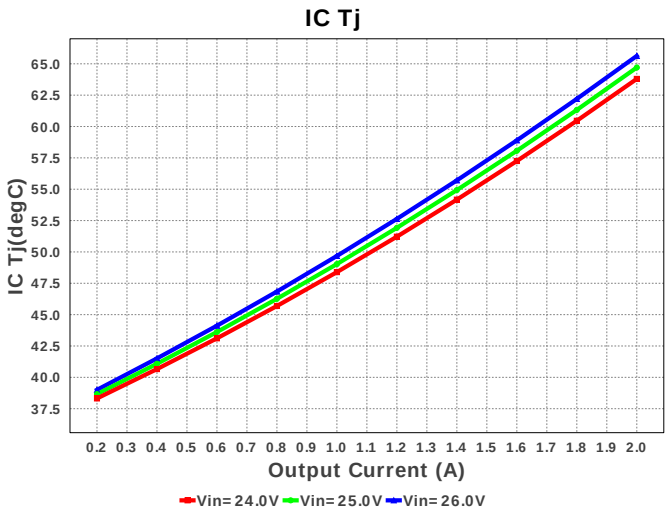
Design : 4769541/3 LMR14030SDDAR
LMR14030SDDAR 24.0V-26.0V to 12.00V @ 2.0002249999999995A

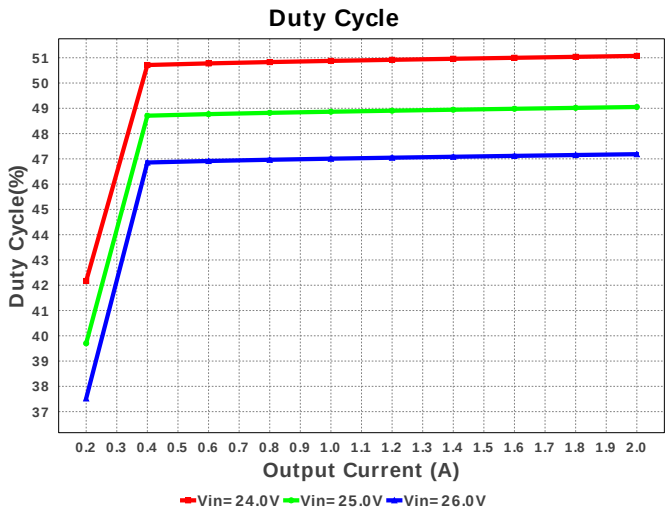


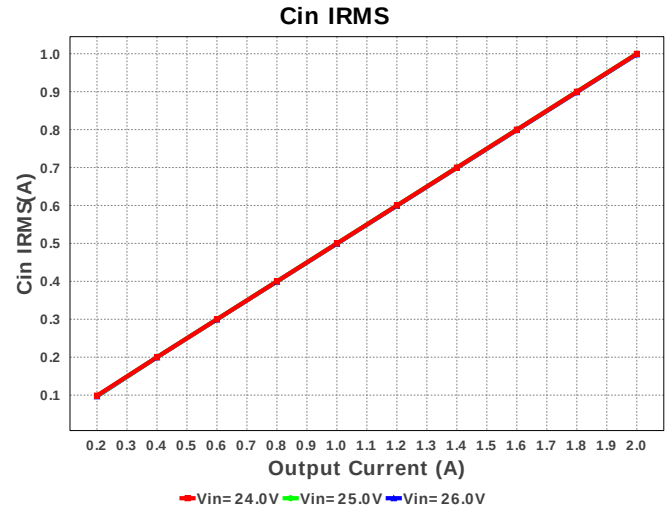
Electrical BOM

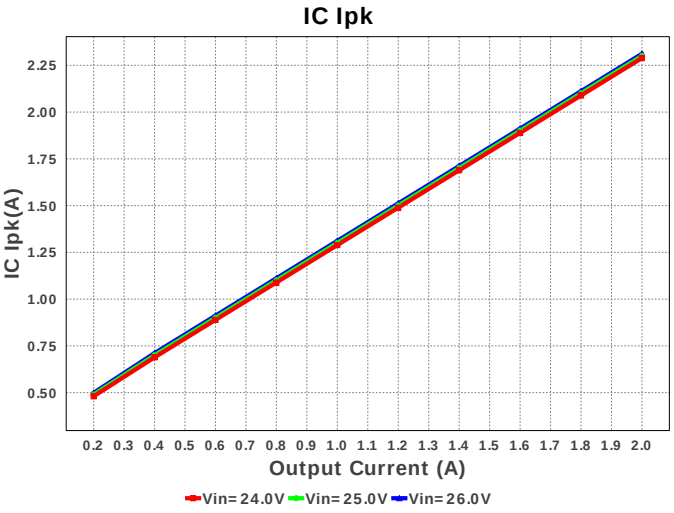
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
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.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 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	CRCW040222K6FKED Series= CRCW..e3	Res= 22.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

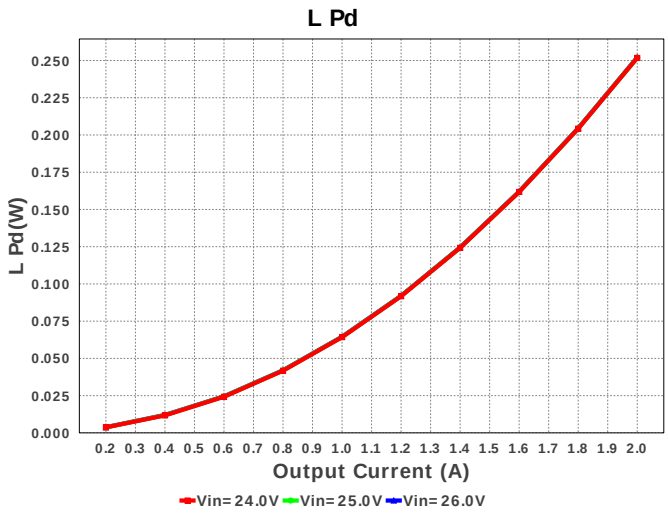
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14030SDDAR	Switcher	1	$1.68	DDA0008E_N 57 mm²

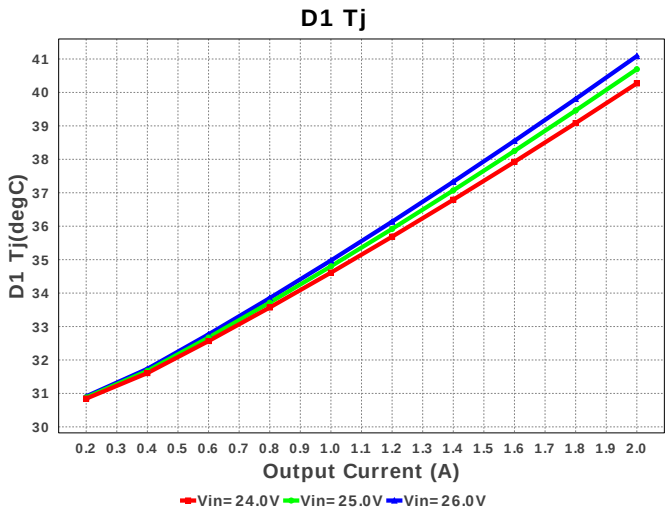


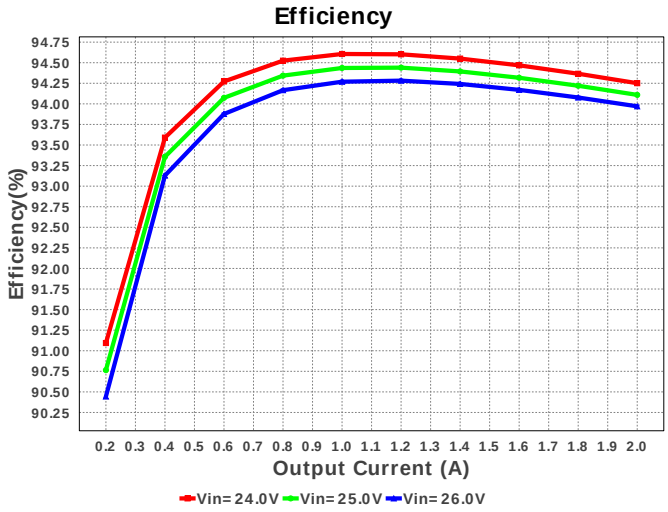


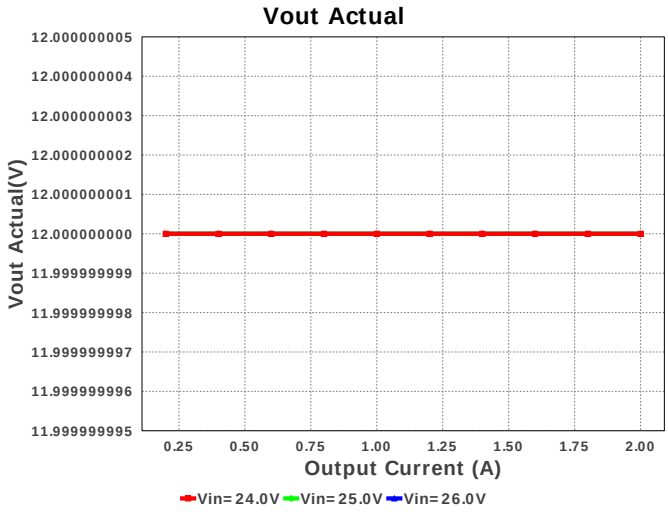


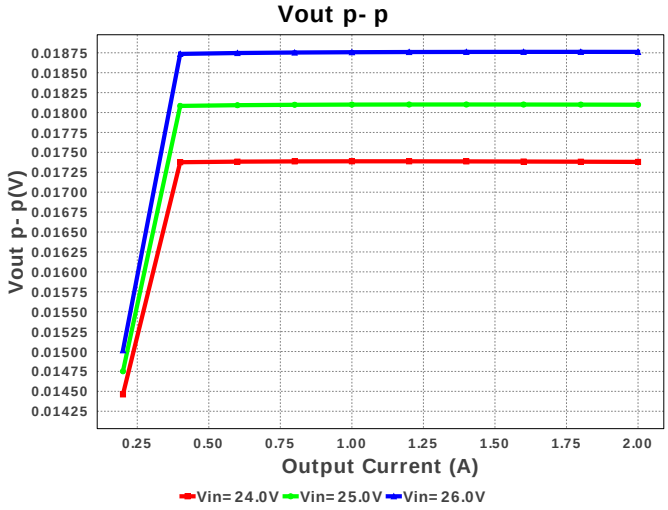


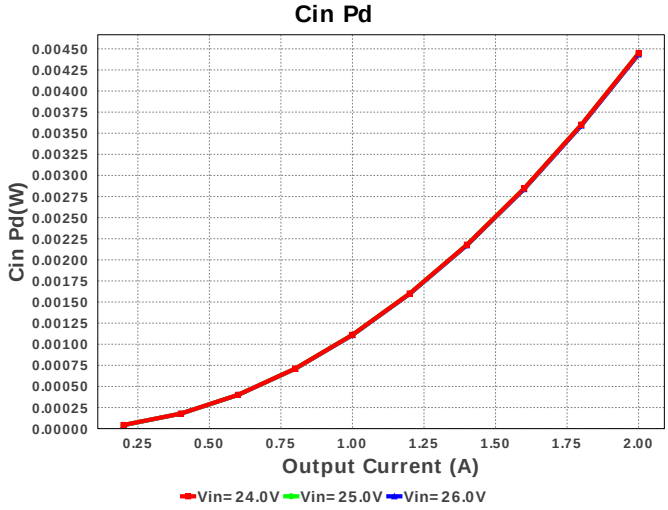


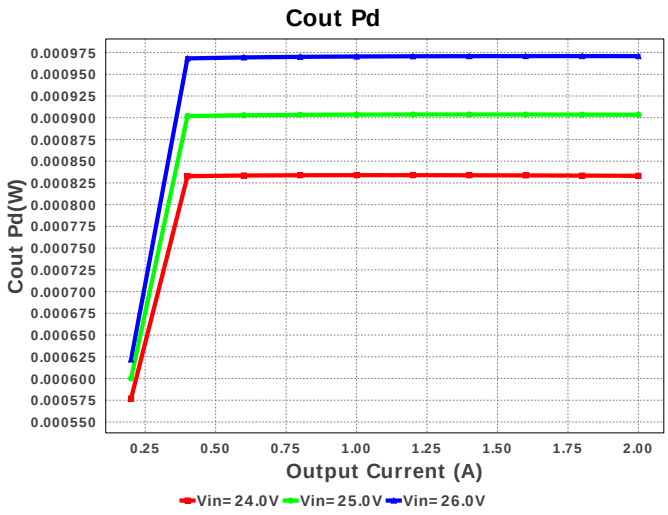


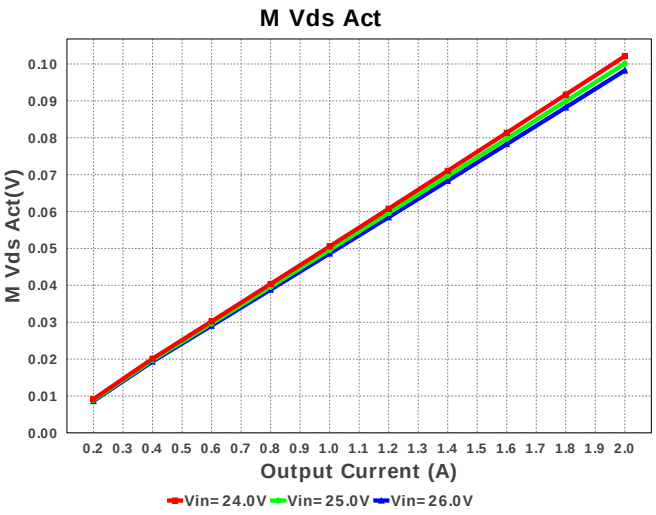


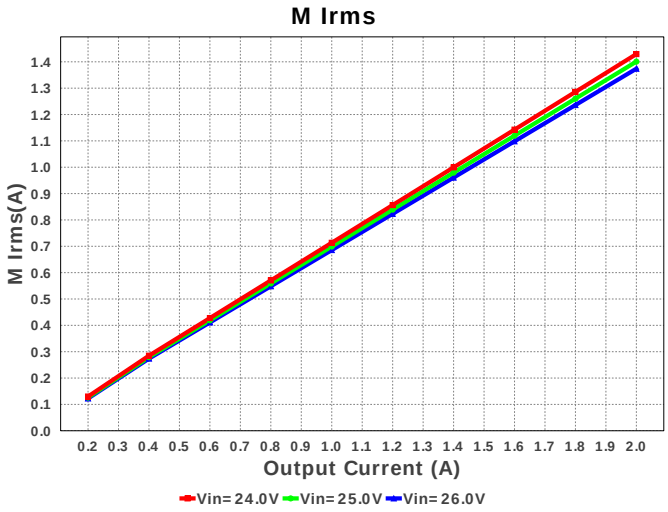


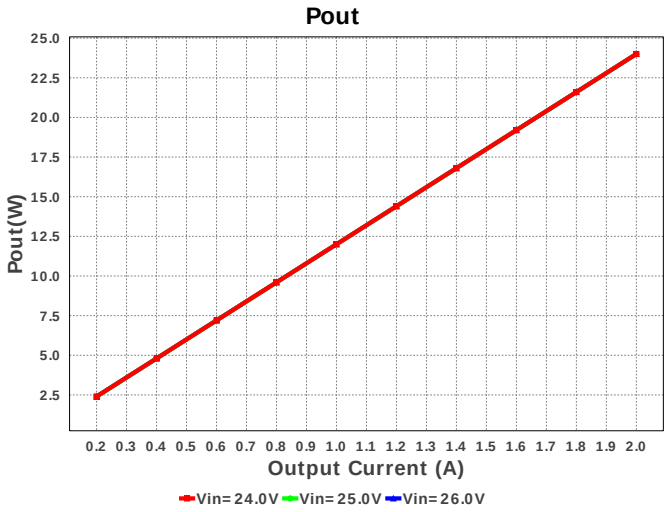


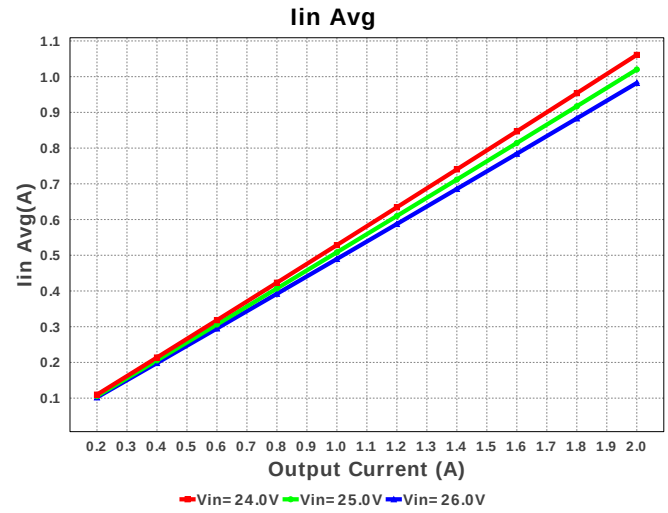


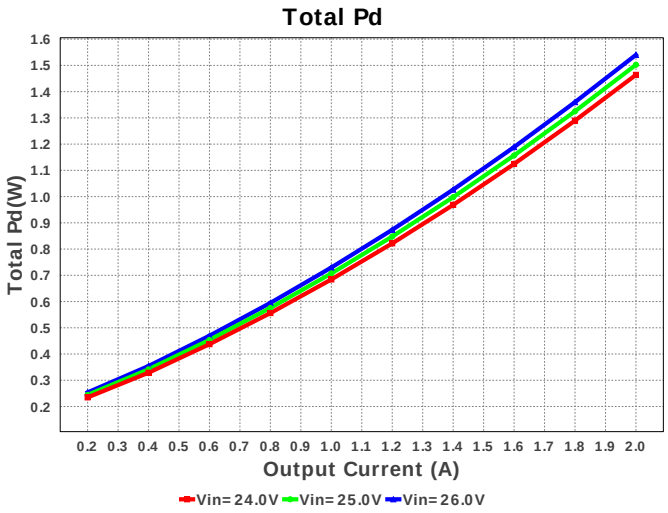


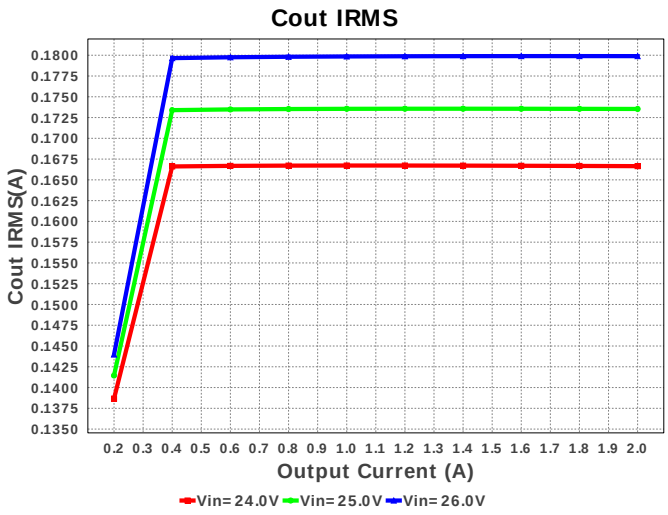


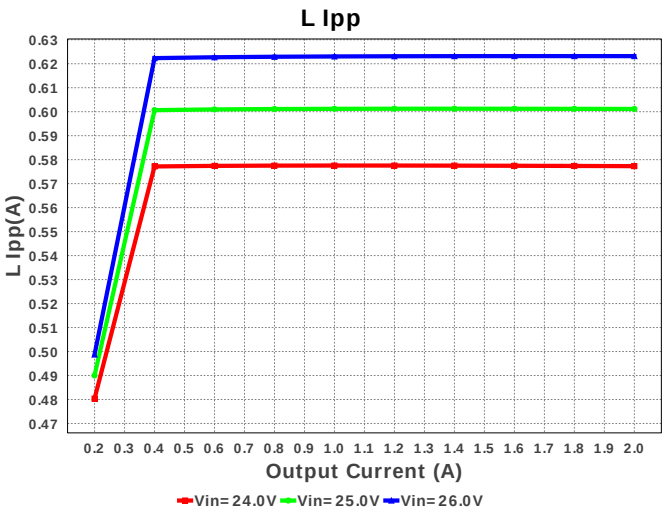


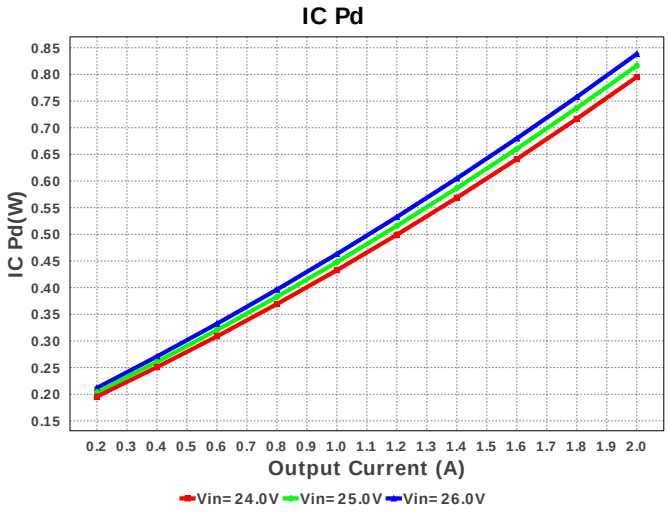


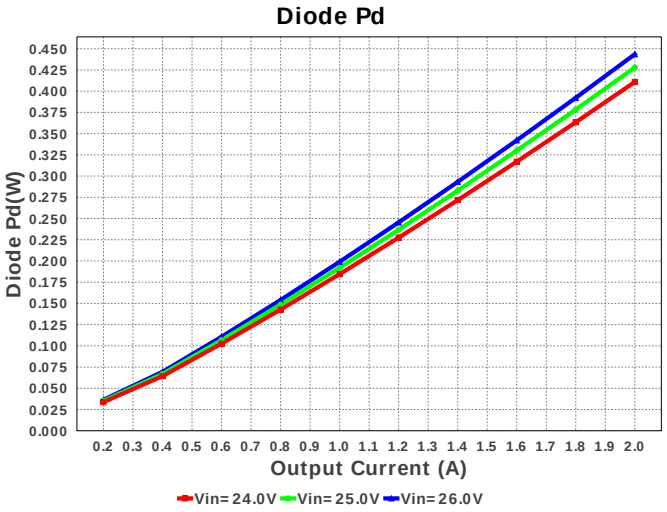


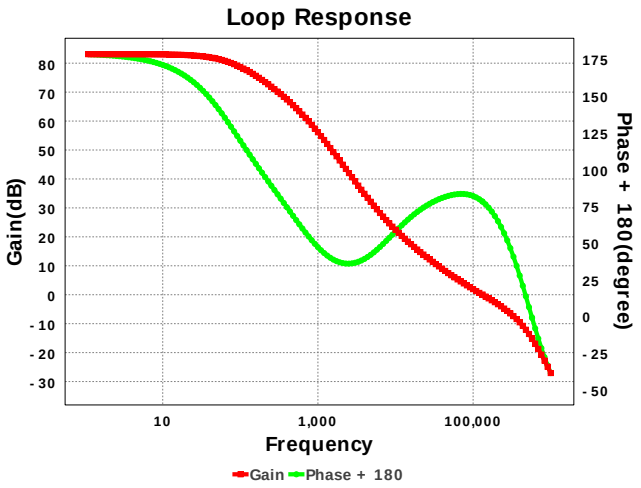












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	998.451 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	179.894 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.312 A	Current	Peak switch current in IC
4.	Iin Avg	982.35 mA	Current	Average input current
5.	L Ipp	623.17 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.374 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	1.053 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	98.215 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Mode	CCM	General	Conduction Mode
13.	Pout	24.0 W	General	Total output power
14.	Total BOM	$2.52	General	Total BOM Cost
15.	D1 Tj	41.086 degC	Op_Point	D1 junction temperature
16.	Vout Actual	12.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	131.929 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	47.185 %	Op_point	Duty cycle
20.	Efficiency	93.97 %	Op_point	Steady state efficiency
21.	IC Tj	65.209 degC	Op_point	IC junction temperature
22.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.0 A	Op_point	Iout operating point
24.	Phase Marg	78.851 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	26.0 V	Op_point	Vin operating point
26.	Vout p-p	18.761 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	4.434 mW	Power	Input capacitor power dissipation
28.	Cout Pd	970.851 µW	Power	Output capacitor power dissipation
29.	Diode Pd	443.46 mW	Power	Diode power dissipation
30.	IC Pd	838.313 mW	Power	IC power dissipation
31.	L Pd	252.041 mW	Power	Inductor power dissipation
32.	Total Pd	1.54 W	Power	Total Power Dissipation
33.	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	26.0	Maximum input voltage
3.	VinMin	24.0	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.