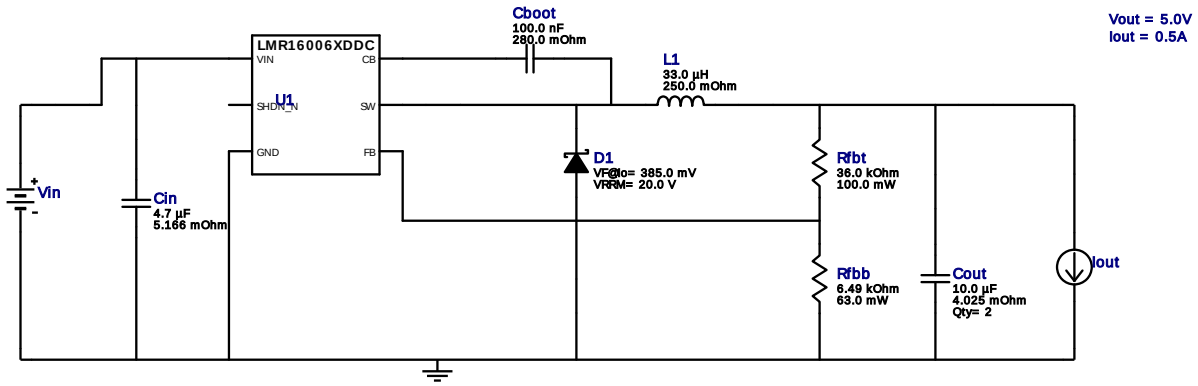
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 12.0V
Vout = 5.0V
Iout = 0.5A

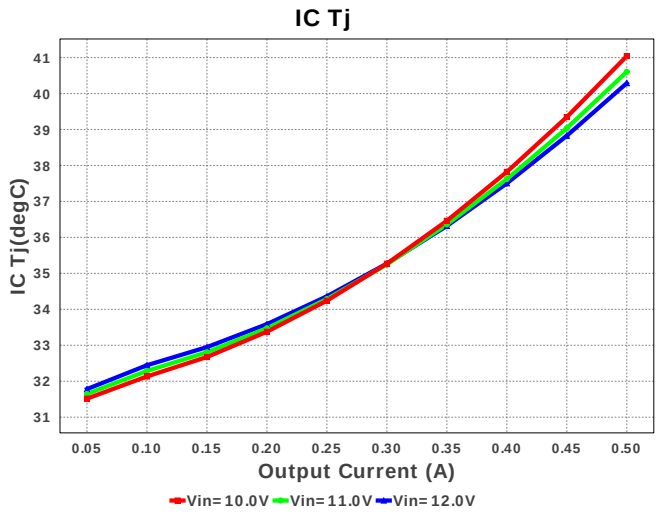
Device = LMR16006XDDCR
Topology = Buck
Created = 7/21/16 7:31:41 PM
BOM Cost = $1.55
BOM Count = 9
Total Pd = 0.27W

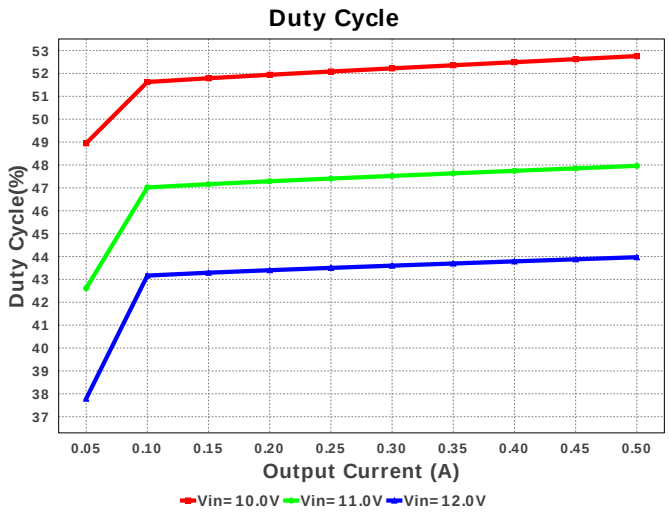
Design : 4742013/247 LMR16006XDDCR
LMR16006XDDCR 10.0V-12.0V to 5.01V @ 0.5A

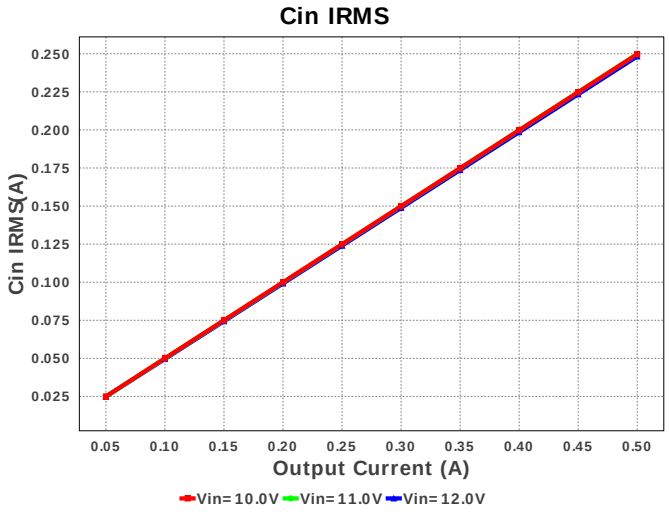


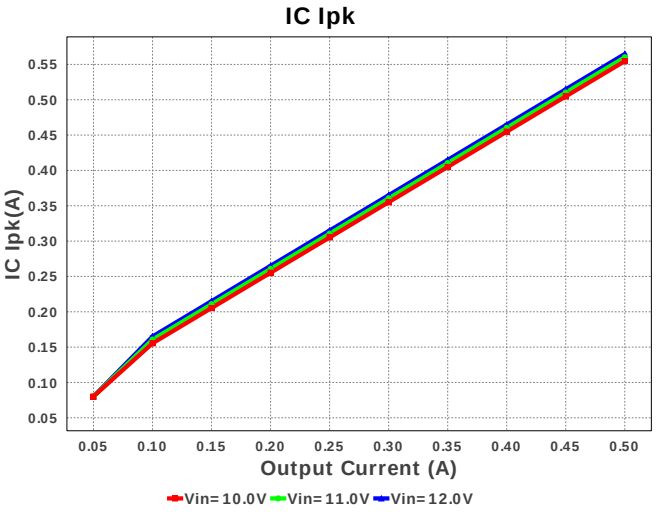
Electrical BOM

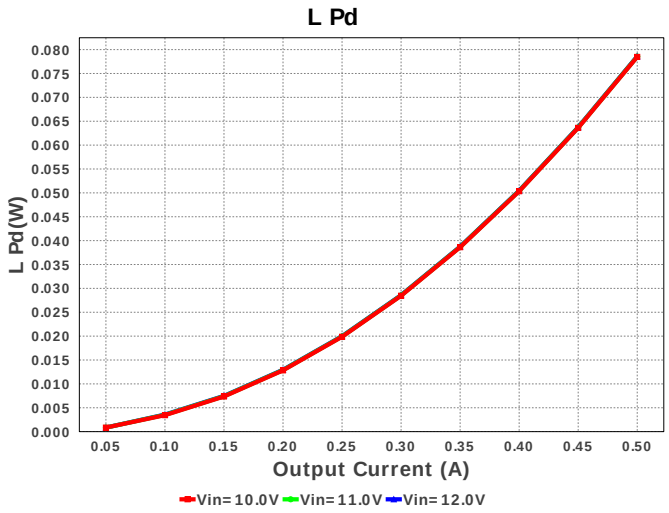
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM21BC81E475KA12L Series= X6S	Cap= 4.7 uF ESR= 5.166 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.02	0805 7 mm²
3.	Cout	MuRata	GRM21BR61A106KE19L Series= X5R	Cap= 10.0 uF ESR= 4.025 mOhm VDC= 10.0 V IRMS= 2.445 A	2	$0.03	0805 7 mm²
4.	D1	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 13 mm²
5.	L1	Bourns	SDR0604-330KL	L= 33.0 µH DCR= 250.0 mOhm	1	$0.18	SDR0604 61 mm²
6.	Rfbb	Vishay-Dale	CRCW04026K49FKED Series= CRCW..e3	Res= 6.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	Rfbt	Yageo America	RC0603FR-0736KL Series= ?	Res= 36.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
8.	U1	Texas Instruments	LMR16006XDDCR	Switcher	1	$1.20	DDC0006A 10 mm²

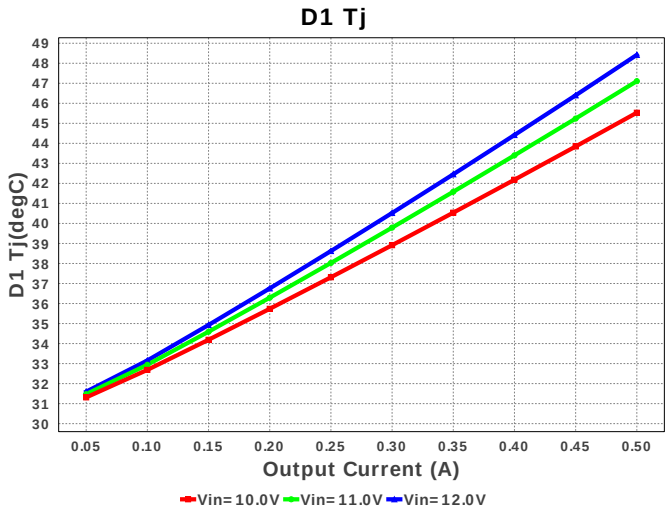


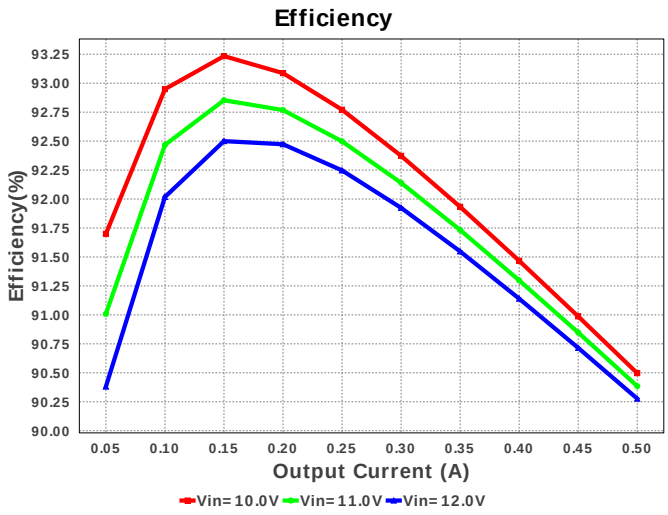


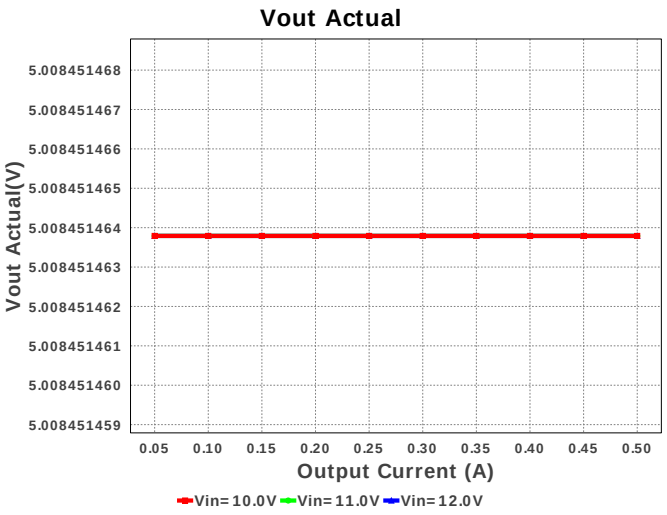


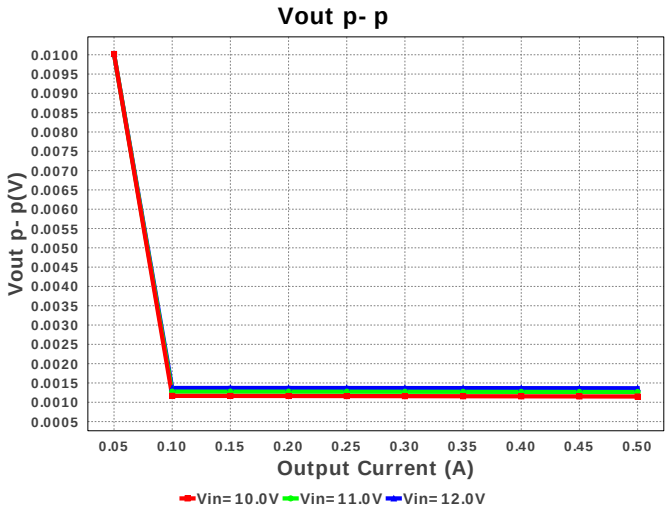


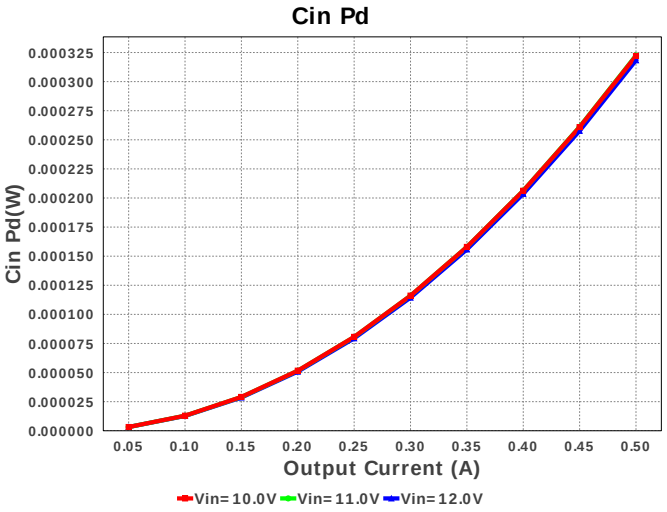


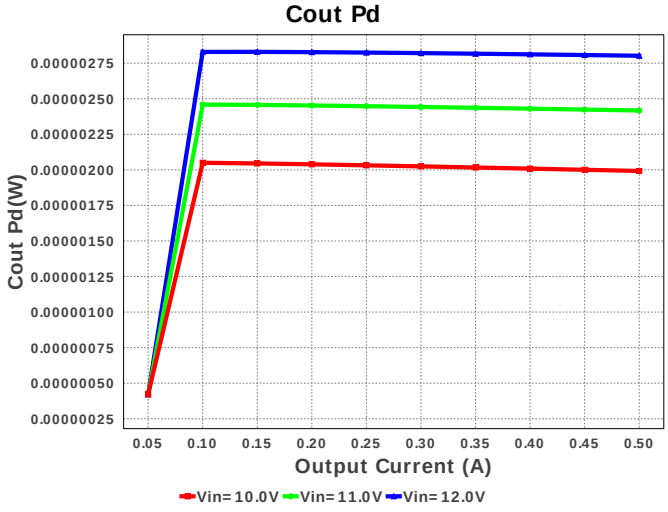


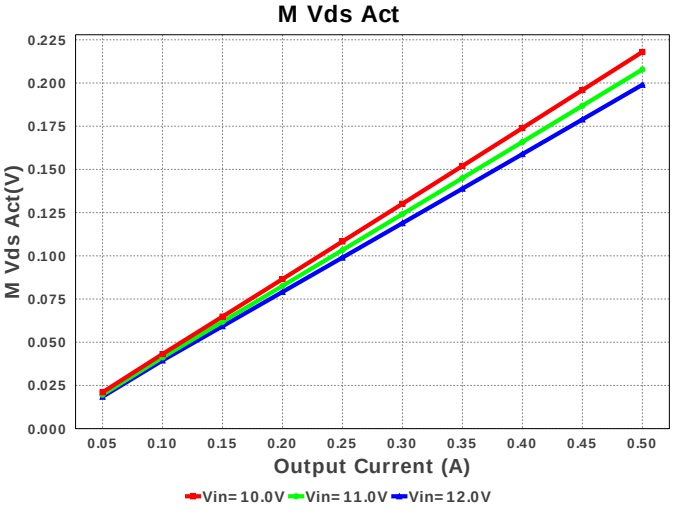


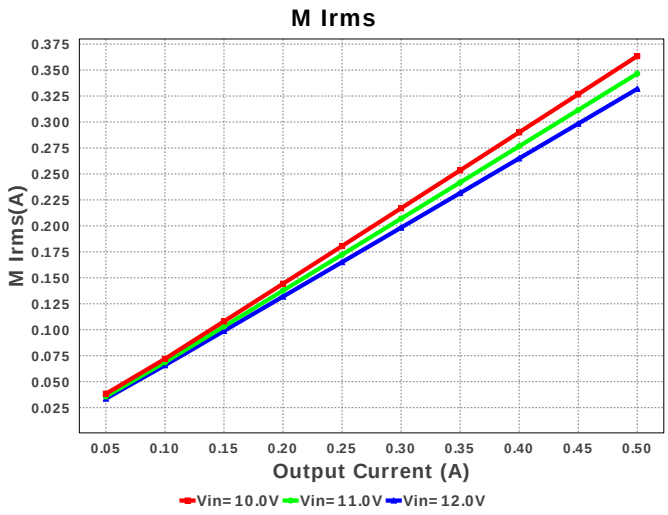


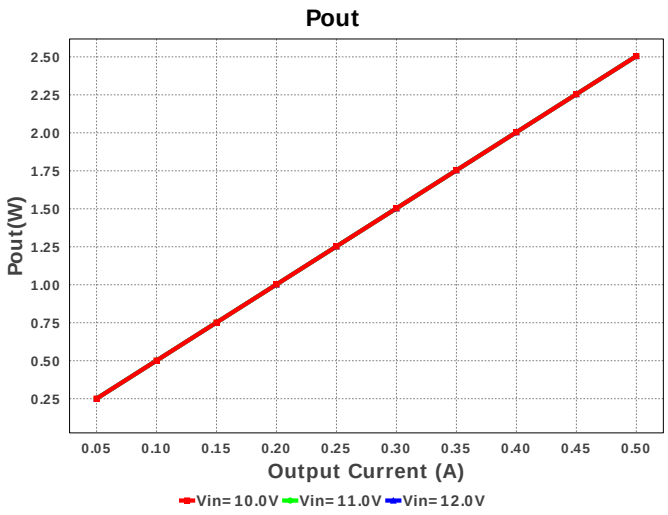


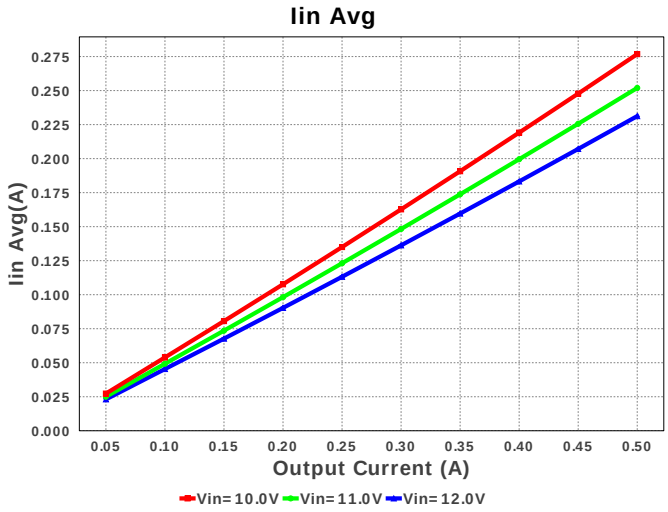


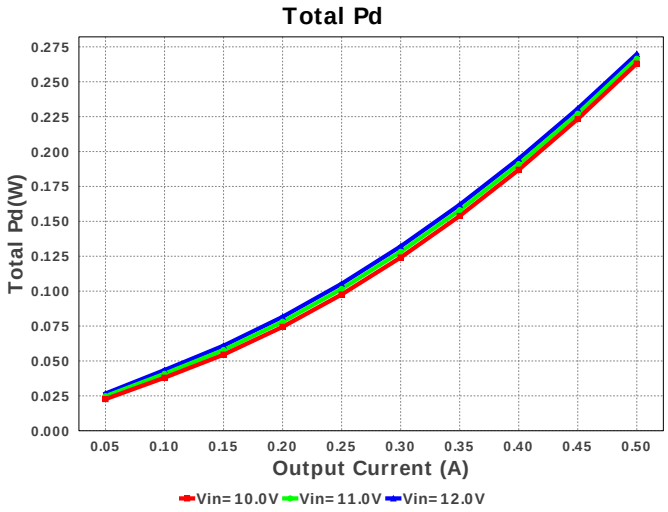


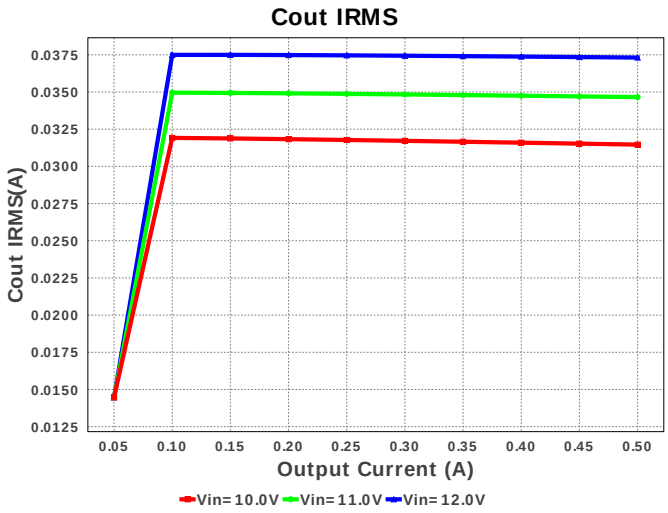


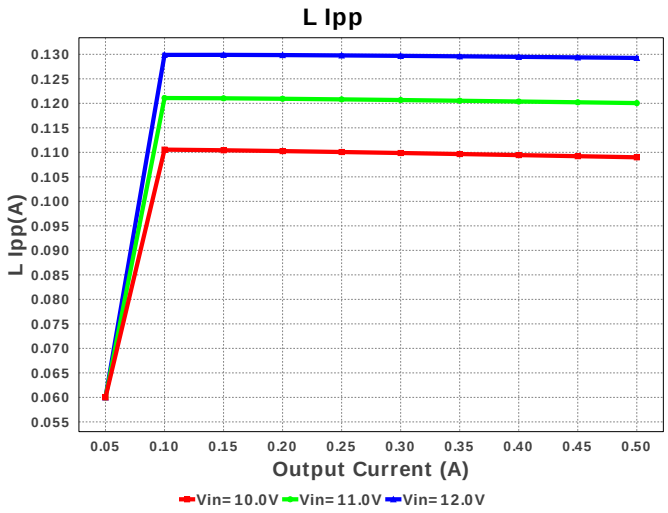


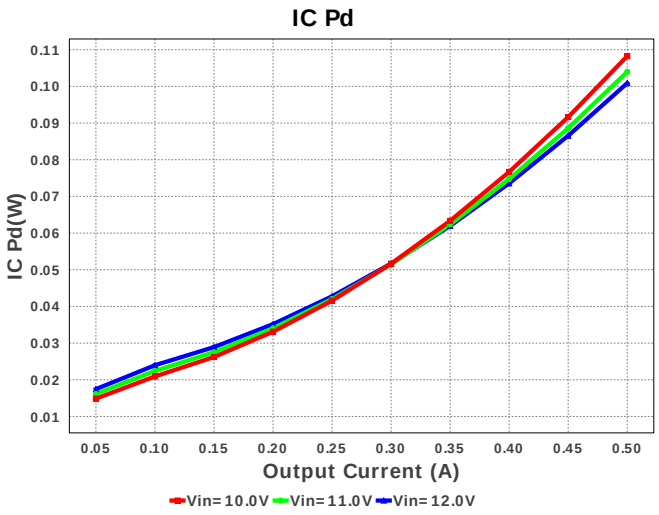


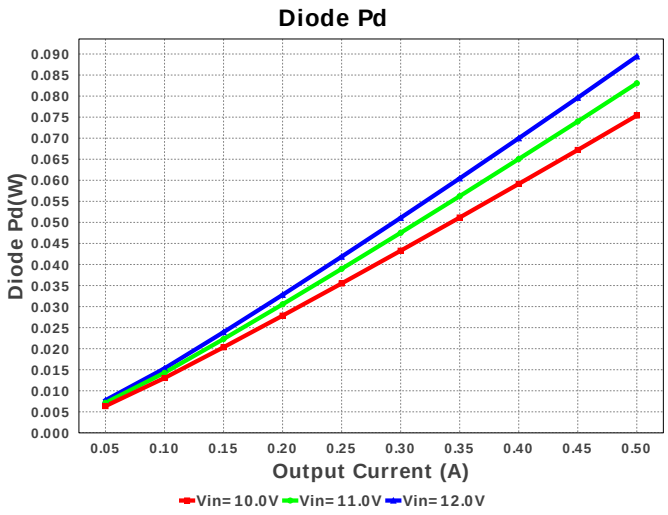


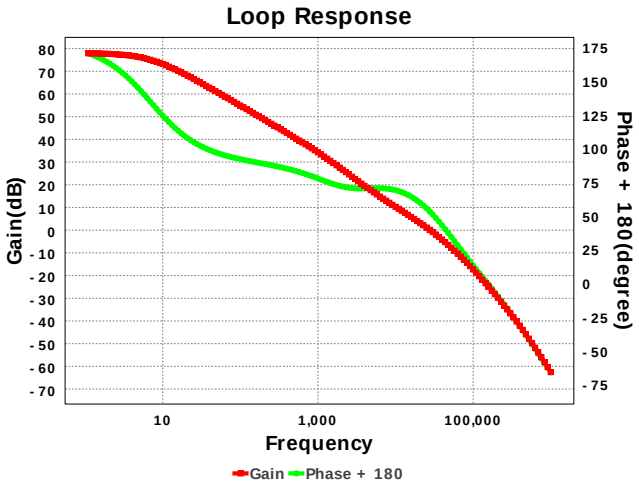












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	248.233 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	37.315 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	564.749 mA	Current	Peak switch current in IC
4.	Iin Avg	231.23 mA	Current	Average input current
5.	L Ipp	129.26 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	331.855 mA	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	119.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	700.0 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	198.975 mV	General	Voltage drop across the MosFET
12.	Pout	2.505 W	General	Total output power
13.	Total BOM	$1.55	General	Total BOM Cost
14.	D1 Tj	48.42 degC	Op_Point	D1 junction temperature
15.	Vout Actual	5.008 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.01 V	Op_Point	Operational Output Voltage
17.	Cross Freq	27.999 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	43.969 %	Op_point	Duty cycle
19.	Efficiency	90.277 %	Op_point	Steady state efficiency
20.	IC Tj	40.29 degC	Op_point	IC junction temperature
21.	ICThetaJA	102.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	500.0 mA	Op_point	Iout operating point
23.	Phase Marg	53.519 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	12.0 V	Op_point	Vin operating point
25.	Vout p-p	1.364 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	318.328 µW	Power	Input capacitor power dissipation
27.	Cout Pd	2.802 µW	Power	Output capacitor power dissipation
28.	Diode Pd	89.418 mW	Power	Diode power dissipation
29.	IC Pd	100.88 mW	Power	IC power dissipation
30.	L Pd	78.597 mW	Power	Inductor power dissipation
31.	Total Pd	269.79 mW	Power	Total Power Dissipation

#	Name	Value	Category	Description
32.	Vout Tolerance	4.105 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	12.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LMR16006X	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR16006X** Product Folder : http://www.ti.com/product/LMR16006 : contains the data sheet and other resources.