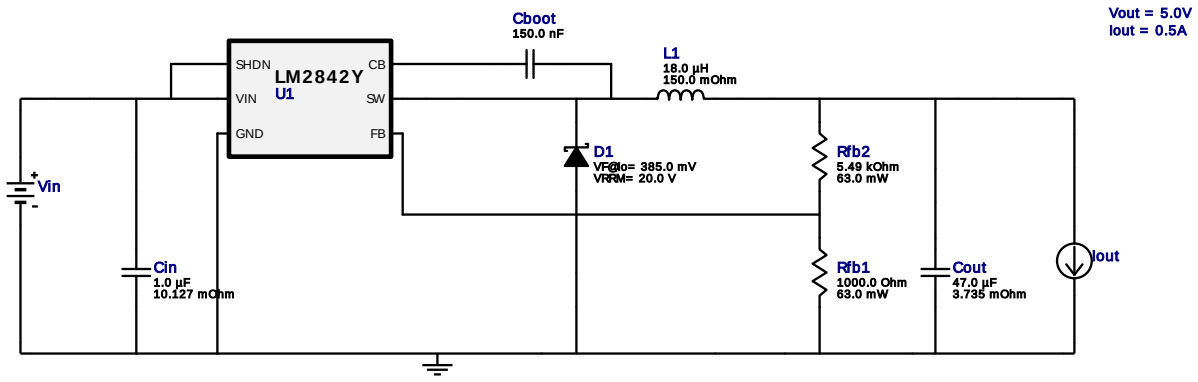
WEBENCH® Design Report

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

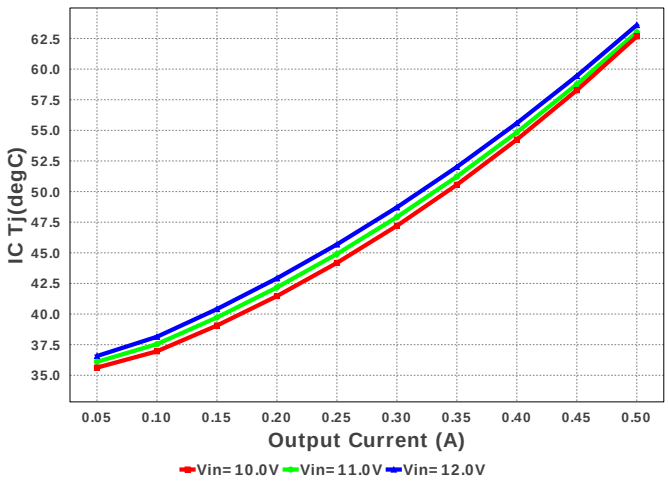
Device = LM2842YMK-ADJL/NOPB
Topology = Buck
Created = 7/24/16 5:35:37 PM
BOM Cost = $1.68
BOM Count = 8
Total Pd = 0.41W

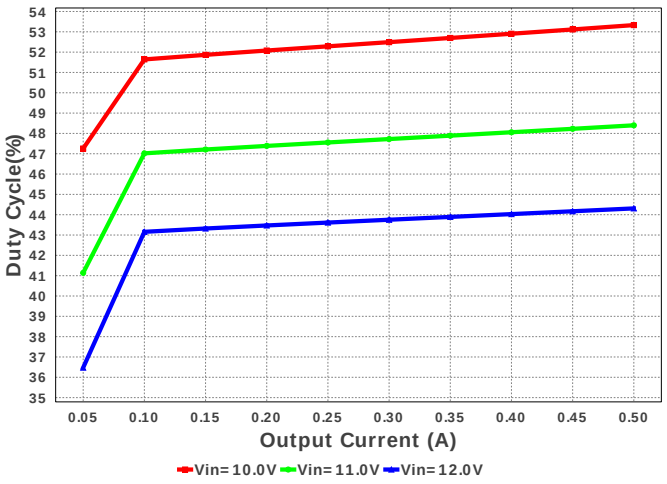
Design : 4742013/265 LM2842YMK-ADJL/NOPB
LM2842YMK-ADJL/NOPB 10.0V-12.0V to 5.00V @ 0.5A

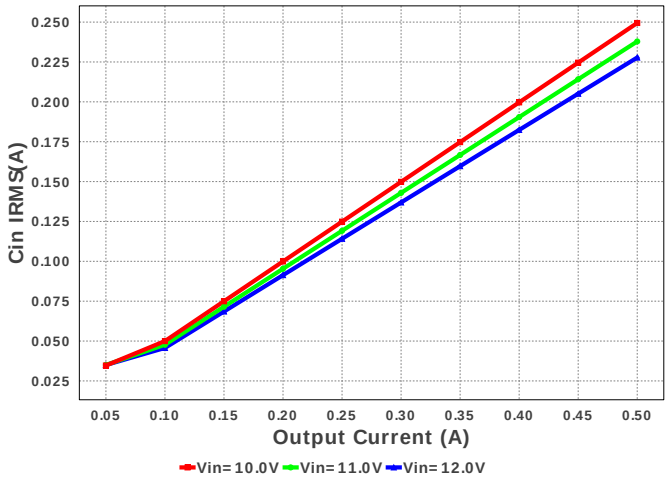


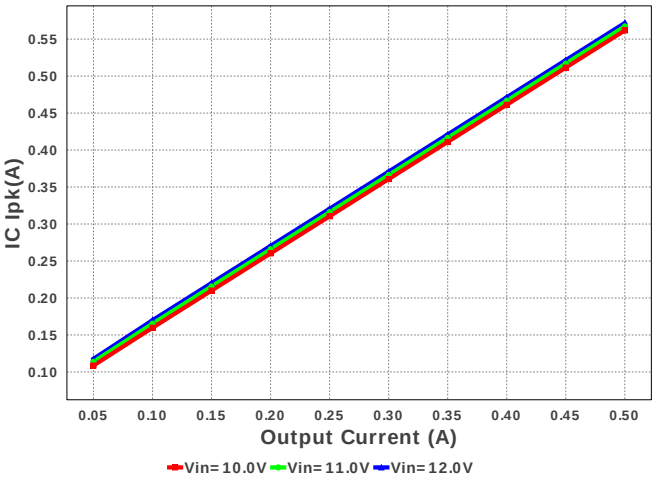
Electrical BOM

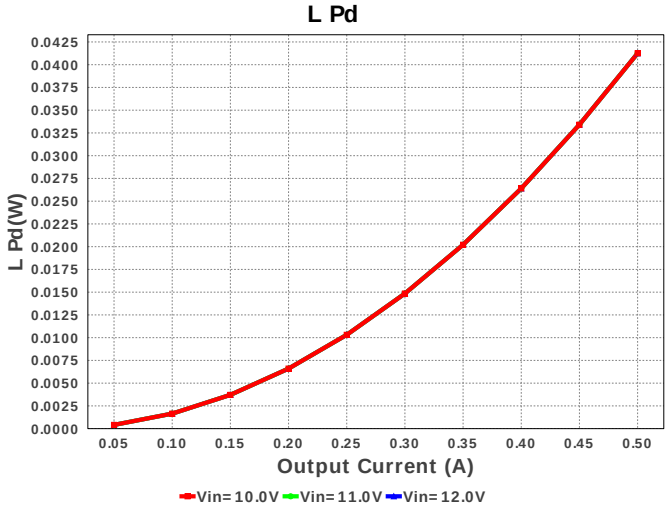
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R60J154KE01D Series= X5R	Cap= 150.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cin	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	1	$0.01	0603 5 mm²
3.	Cout	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	1	$0.10	1206_190 11 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	SDR0604-180YL	L= 18.0 µH DCR= 150.0 mOhm	1	$0.18	SDR0604 61 mm²
6.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	Rfb2	Vishay-Dale	CRCW04025K49FKED Series= CRCW..e3	Res= 5.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	U1	Texas Instruments	LM2842YMK-ADJL/NOPB	Switcher	1	$1.30	MK06A 11 mm²

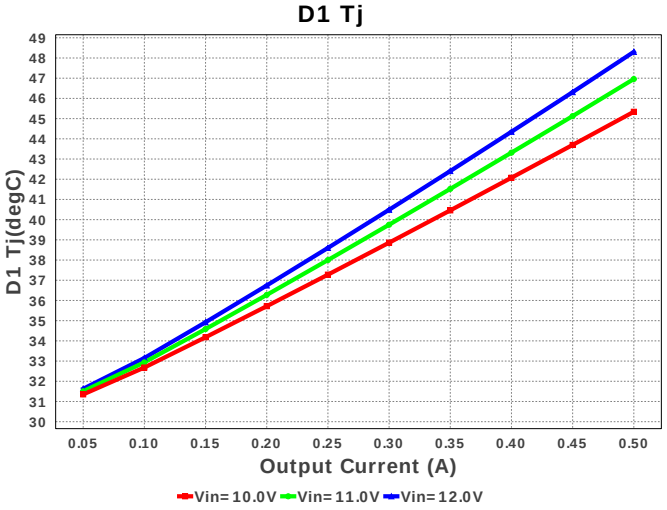




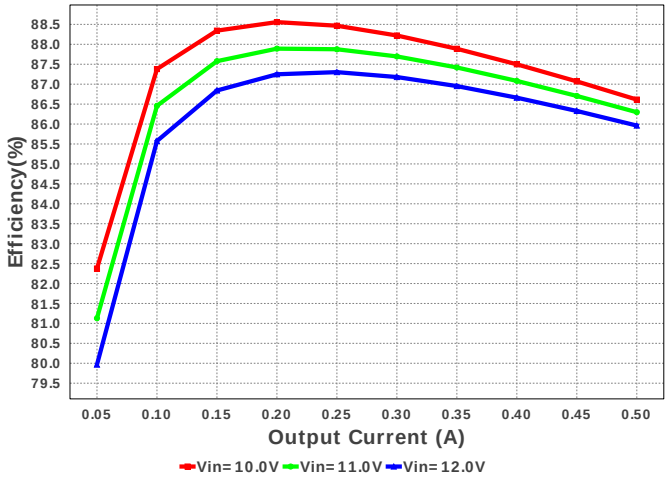




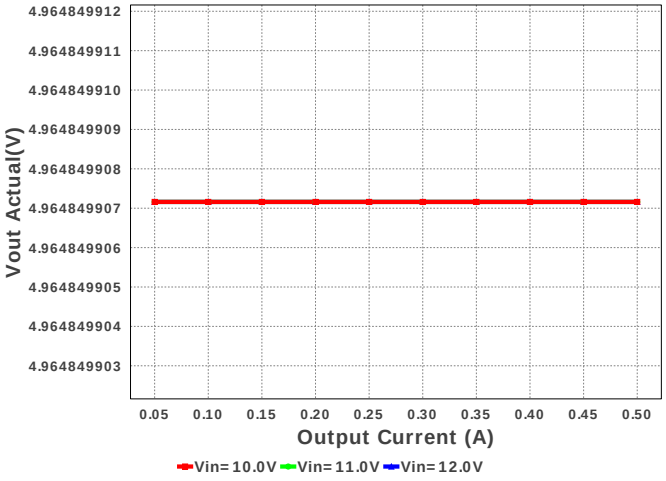




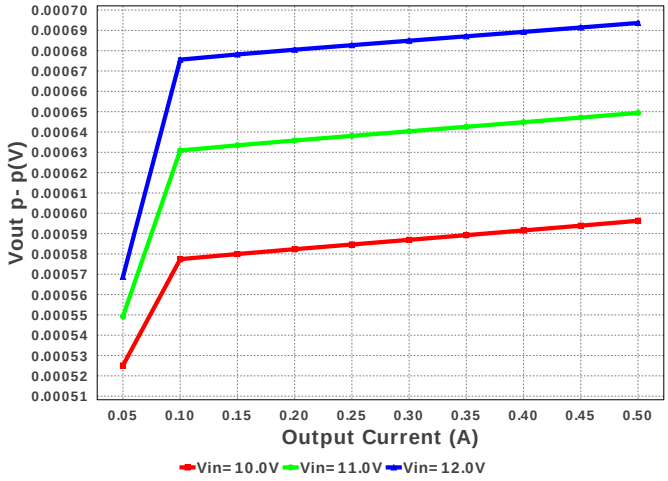
Efficiency



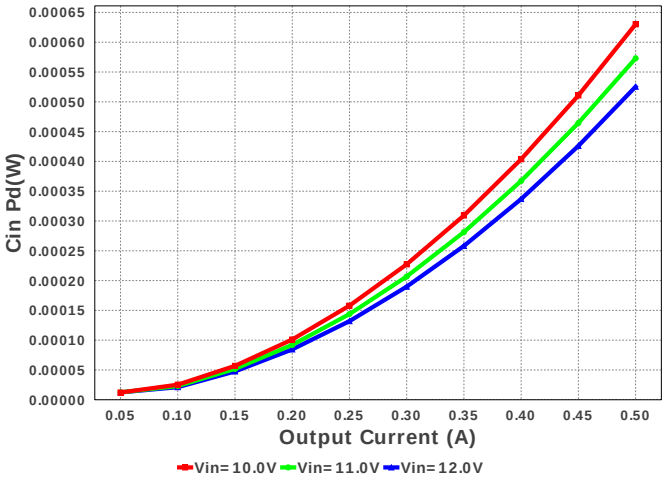
Vout Actual



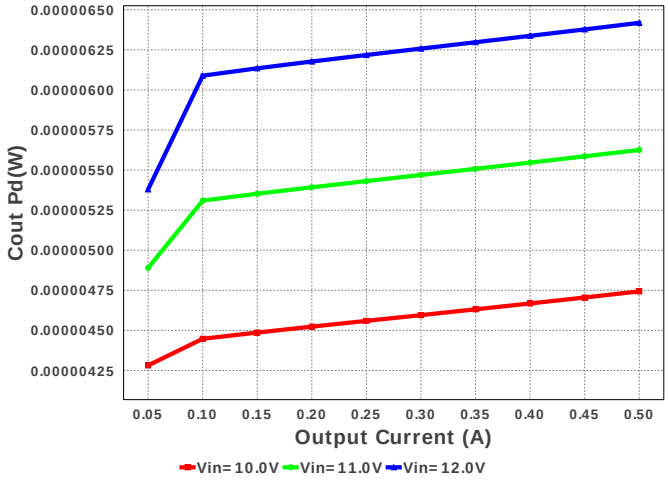
Vout p- p



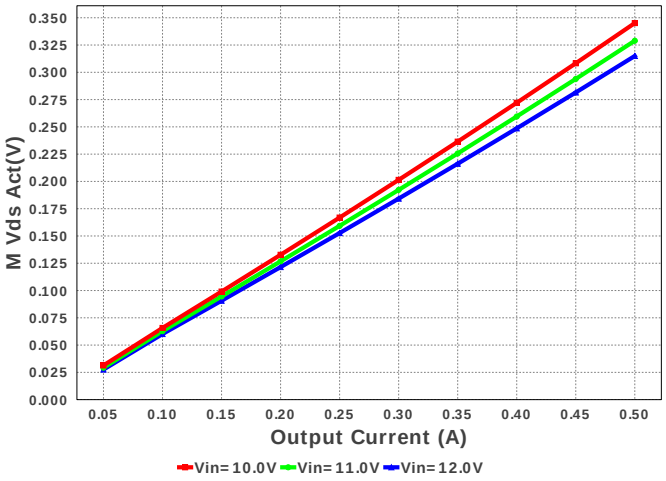
Cin Pd

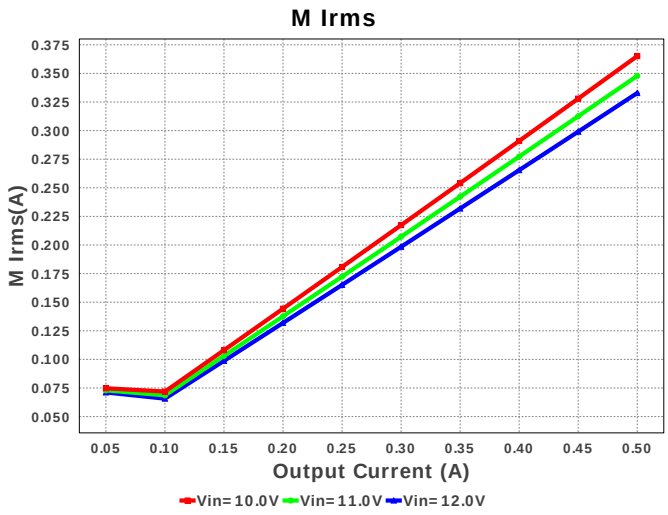


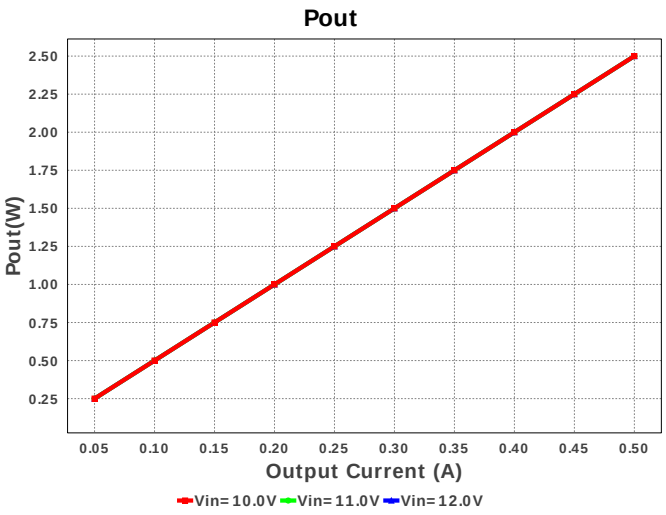
Cout Pd

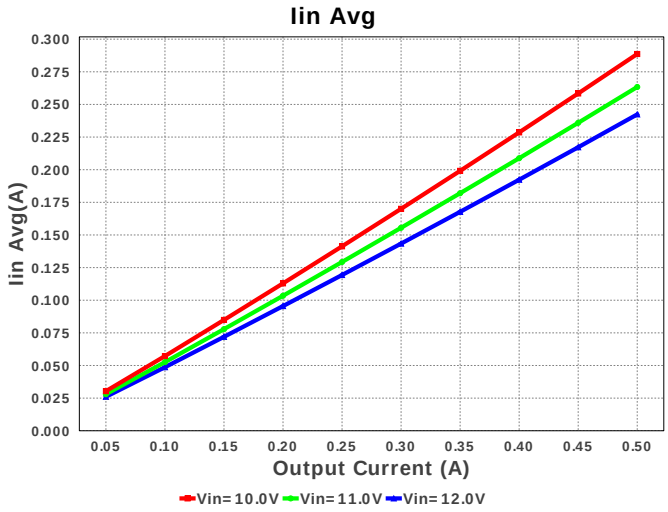


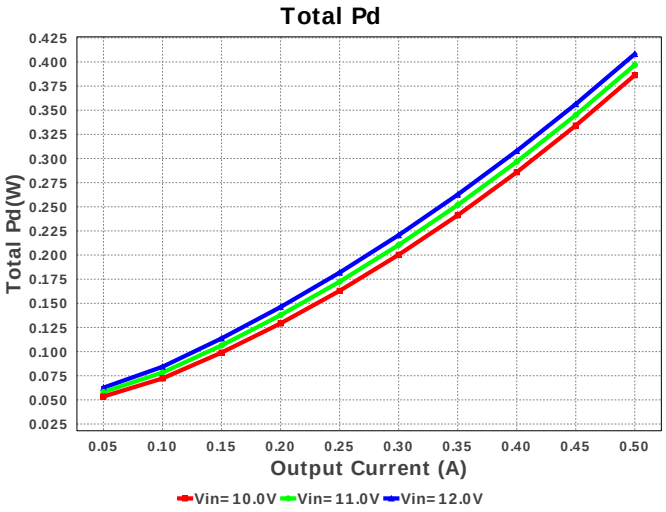
M Vds Act

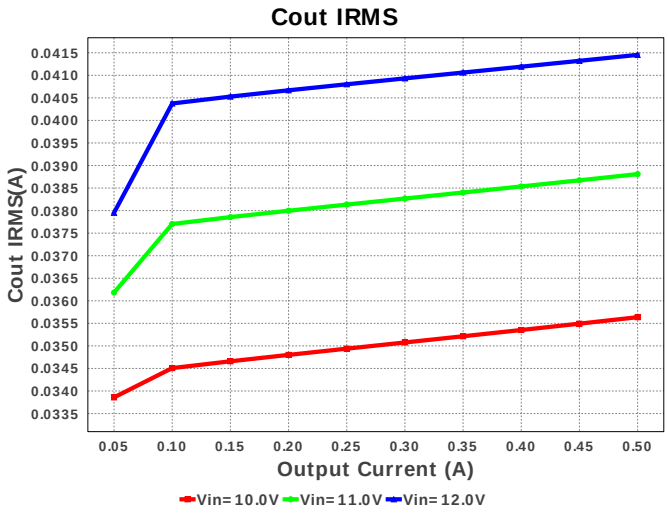


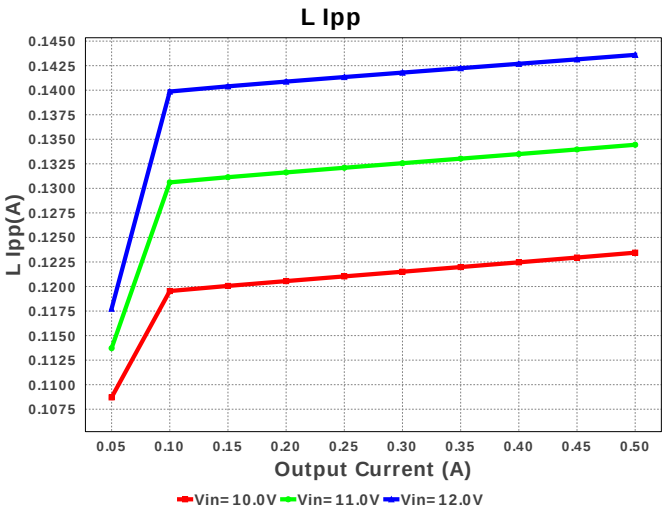


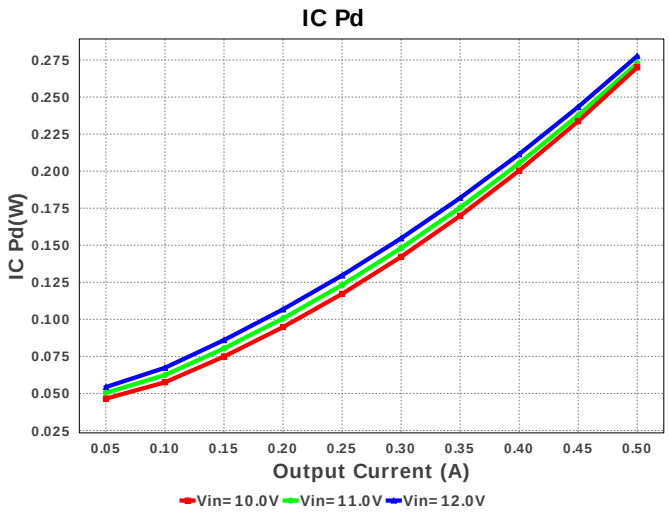


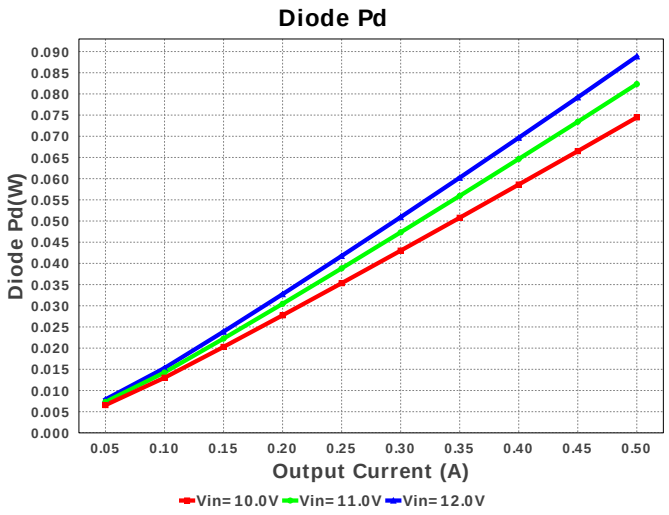












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	227.767 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	41.453 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	571.799 mA	Current	Peak switch current in IC
4.	Iin Avg	242.36 mA	Current	Average input current
5.	L Ipp	143.6 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	332.831 mA	Current	Q Iavg
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	109.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.2 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	314.962 mV	General	Voltage drop across the MosFET
12.	Pout	2.5 W	General	Total output power
13.	Total BOM	$1.68	General	Total BOM Cost
14.	D1 Tj	48.303 degC	Op_Point	D1 junction temperature
15.	Vout Actual	4.965 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	15.727 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	44.311 %	Op_point	Duty cycle
19.	Efficiency	85.962 %	Op_point	Steady state efficiency
20.	IC Tj	63.593 degC	Op_point	IC junction temperature
21.	ICThetaJA	121.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	500.0 mA	Op_point	Iout operating point
23.	Phase Marg	59.1 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	12.0 V	Op_point	Vin operating point
25.	Vout p-p	693.643 µV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	525.365 µW	Power	Input capacitor power dissipation
27.	Cout Pd	6.418 µW	Power	Output capacitor power dissipation
28.	Diode Pd	88.852 mW	Power	Diode power dissipation
29.	IC Pd	277.629 mW	Power	IC power dissipation
30.	L Pd	41.25 mW	Power	Inductor power dissipation
31.	Total Pd	408.27 mW	Power	Total Power Dissipation
32.	Vout Tolerance	4.102 %		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	LM2842Y	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM2842Y** Product Folder : http://www.ti.com/product/LM2842 : contains the data sheet and other resources.