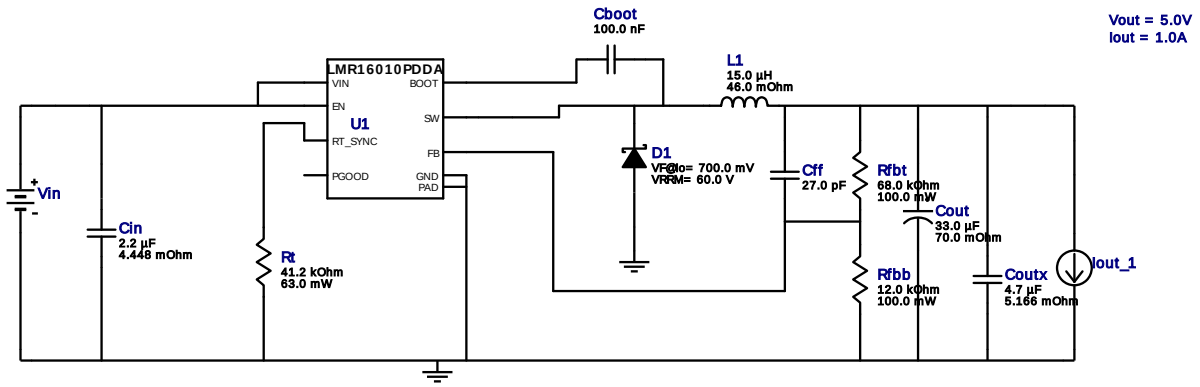
WEBENCH® Design Report

VinMin = 30.0V
VinMax = 37.0V
Vout = 5.0V
Iout = 1.0A

Device = LMR16010PDDAR
Topology = Buck
Created = 7/16/16 1:34:15 AM
BOM Cost = $2.52
BOM Count = 11
Total Pd = 0.95W

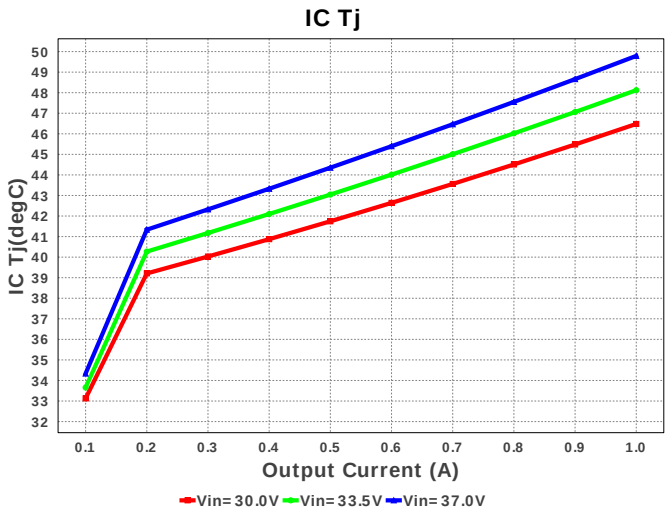
Design : 4742013/94 LMR16010PDDAR
LMR16010PDDAR 30.0V-37.0V to 5.00V @ 1.0001875000000002A

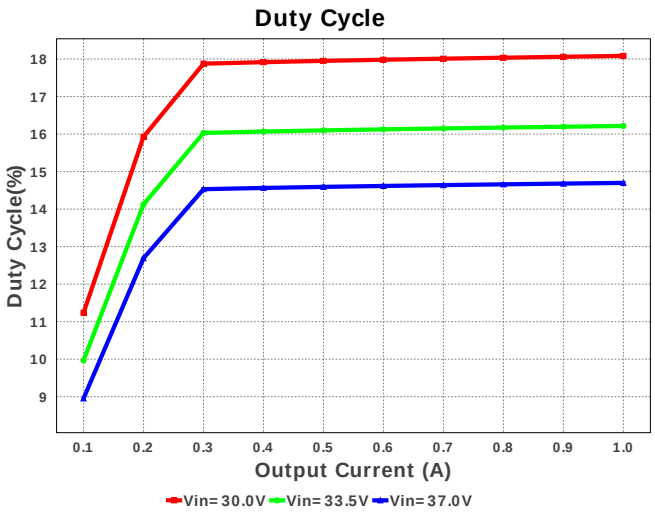


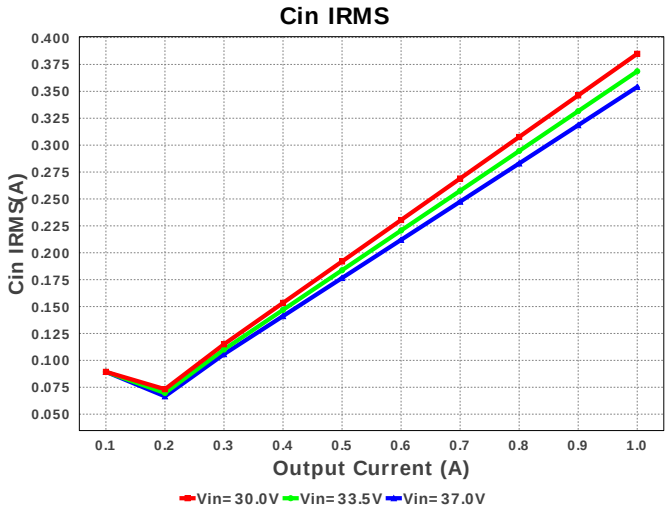
Electrical BOM

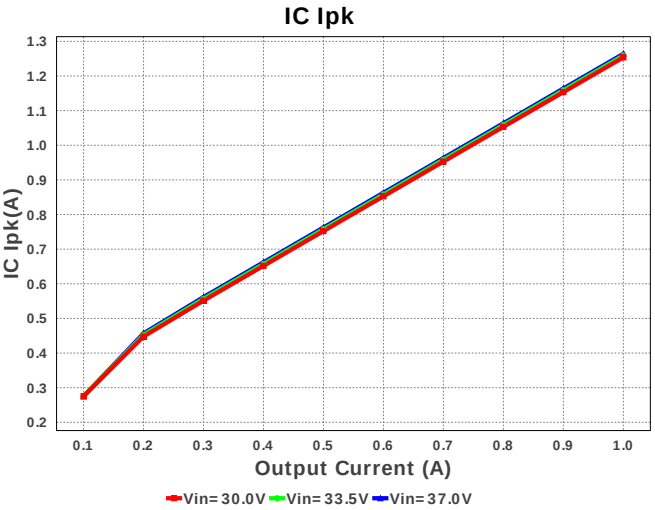
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Cff	Kemet	C0805C270K5GACTU Series= C0G/NP0	Cap= 27.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM31CR71H225KA88L 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
4.	Cout	Panasonic	12TPG33M Series= ?	Cap= 33.0 uF ESR= 70.0 mOhm VDC= 12.5 V IRMS= 1.0 A	1	$0.46	CAPSMT_6_B1G 17 mm²
5.	Coutx	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
6.	D1	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.09	SMA 37 mm²
7.	L1	Bourns	SRU8043-150Y	L= 15.0 µH DCR= 46.0 mOhm	1	$0.33	SRU8043 100 mm²
8.	Rfbb	Yageo America	RC0603FR-0712KL Series= ?	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
9.	Rfbt	Yageo America	RC0603FR-0768KL Series= ?	Res= 68.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
10.	Rt	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

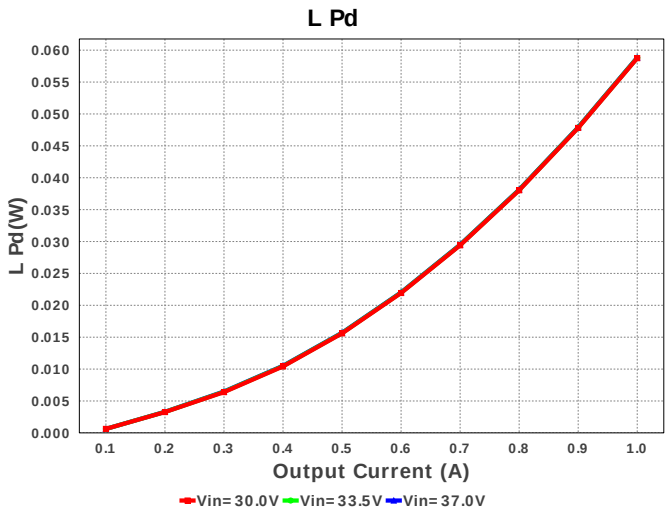
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	LMR16010PDDAR	Switcher	1	$1.50	DDA0008E_N 57 mm^2

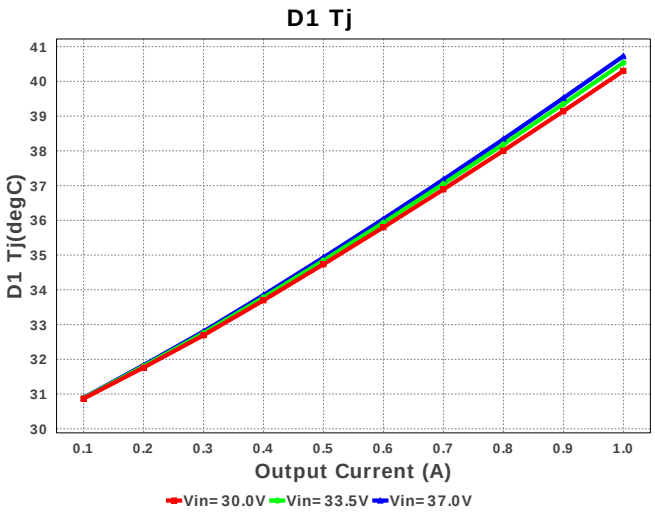


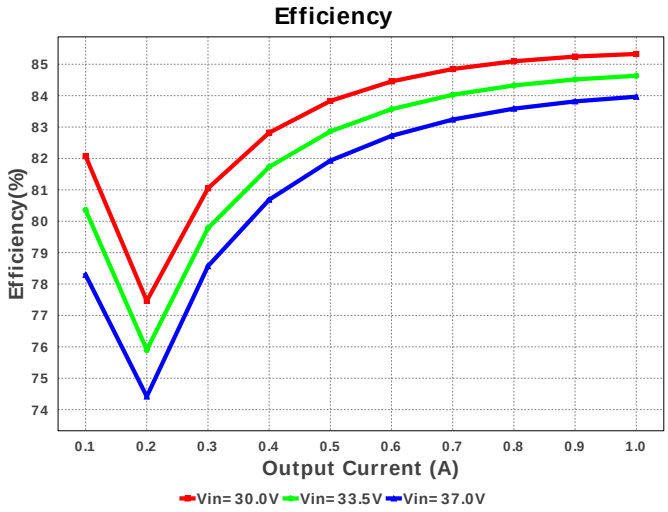


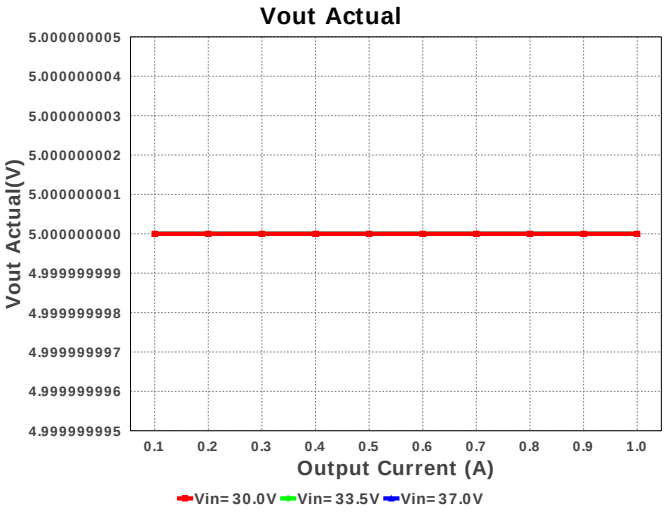


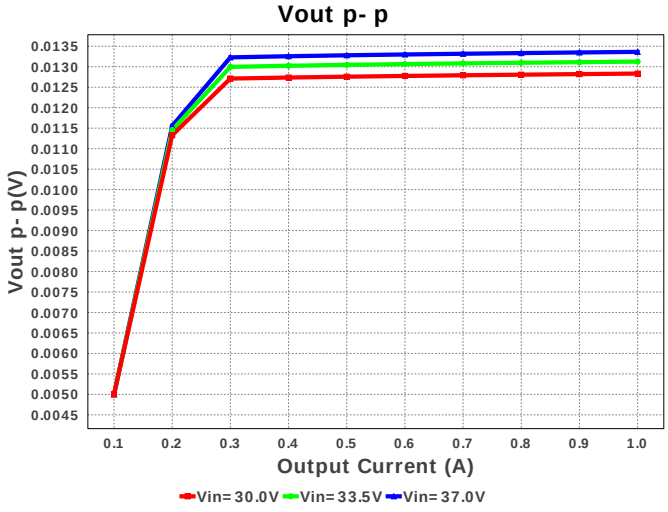


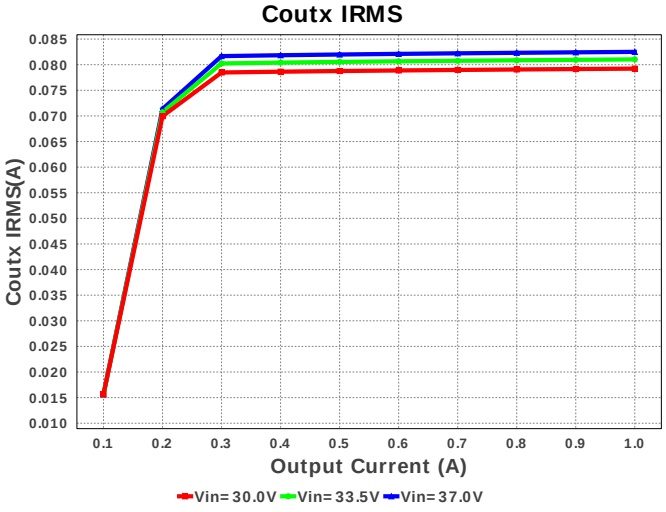


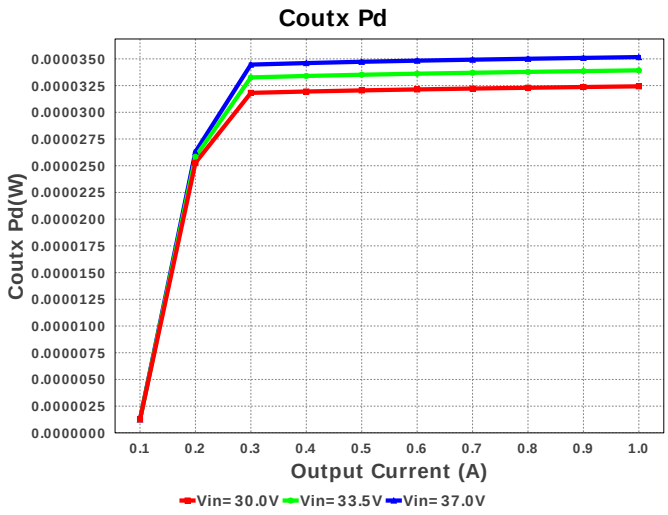


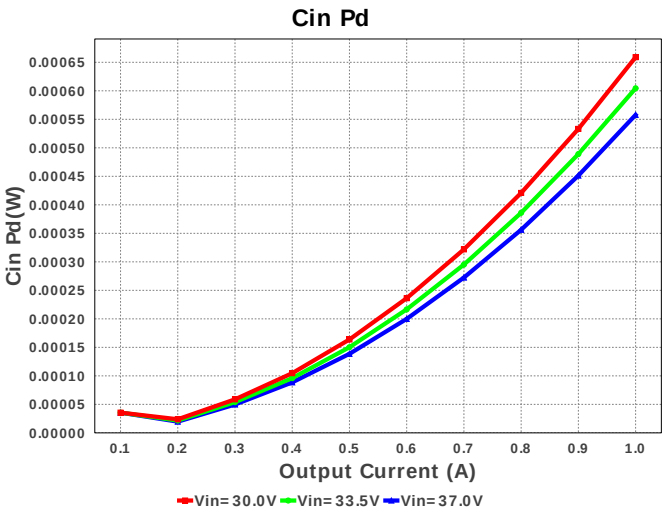


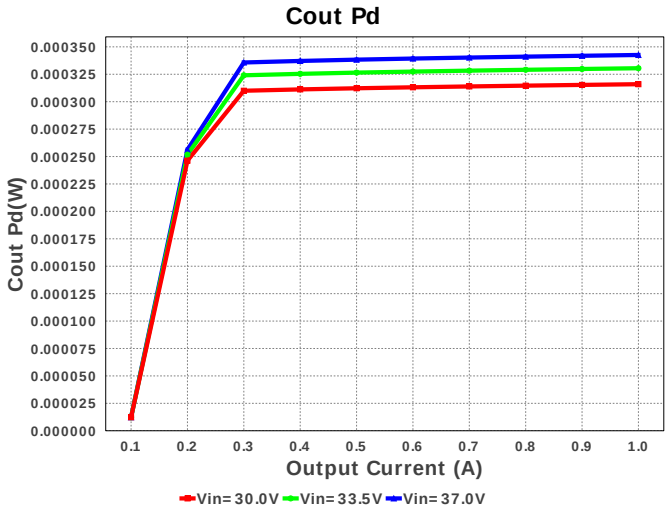


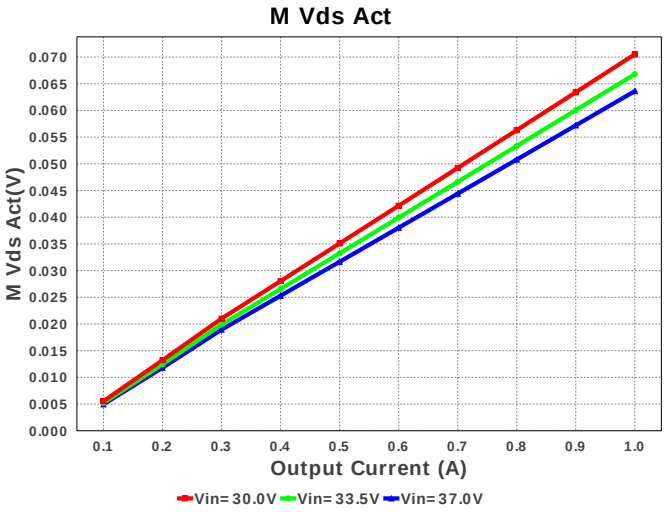


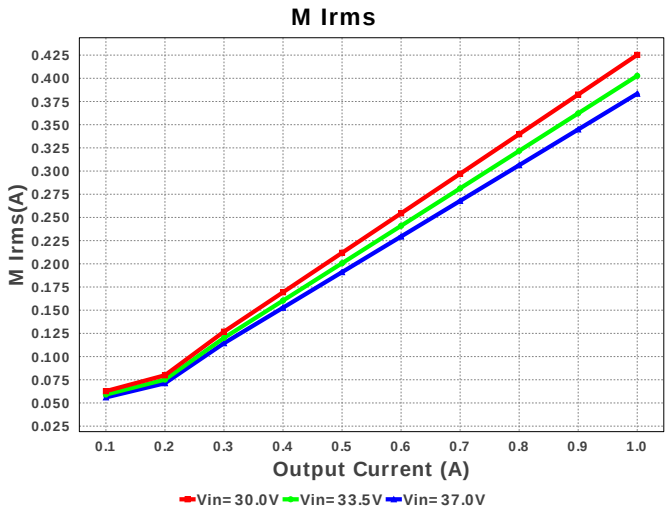


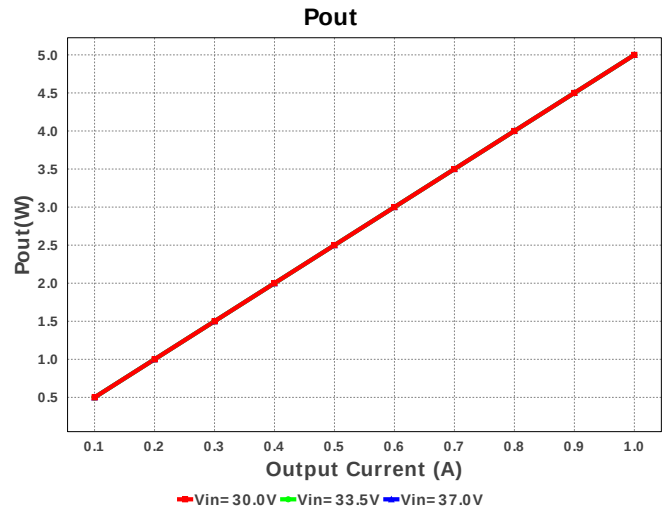


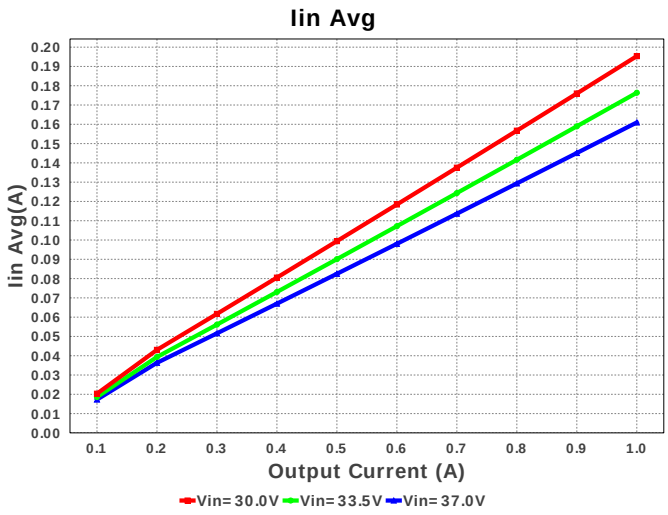


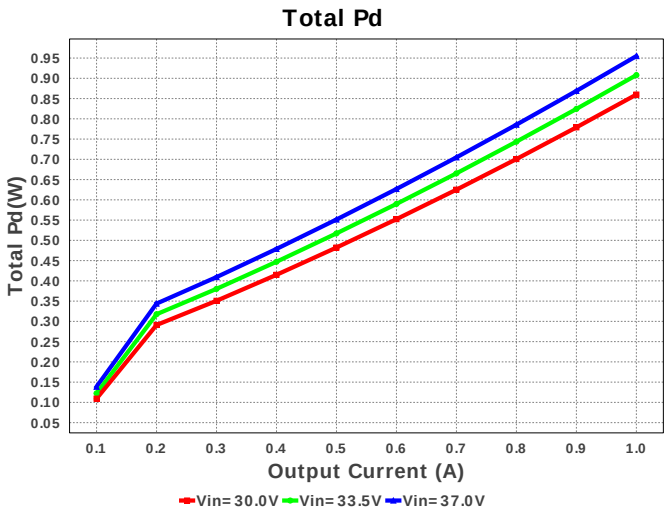


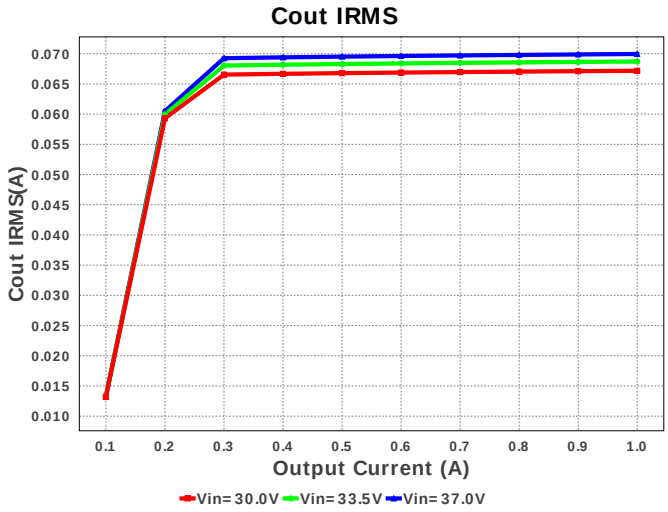


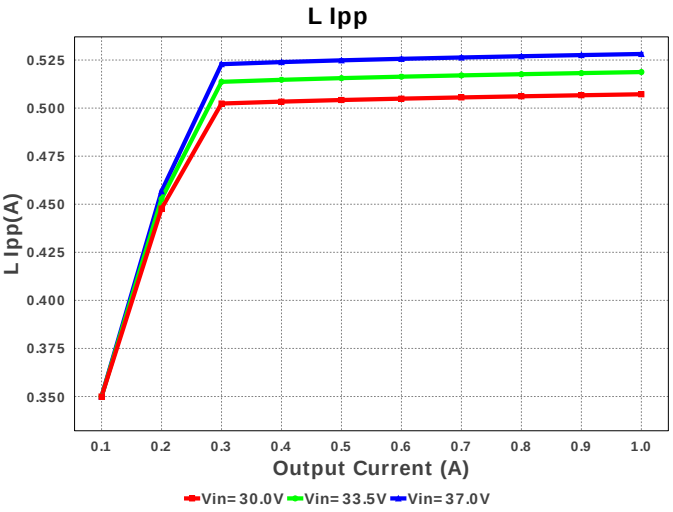


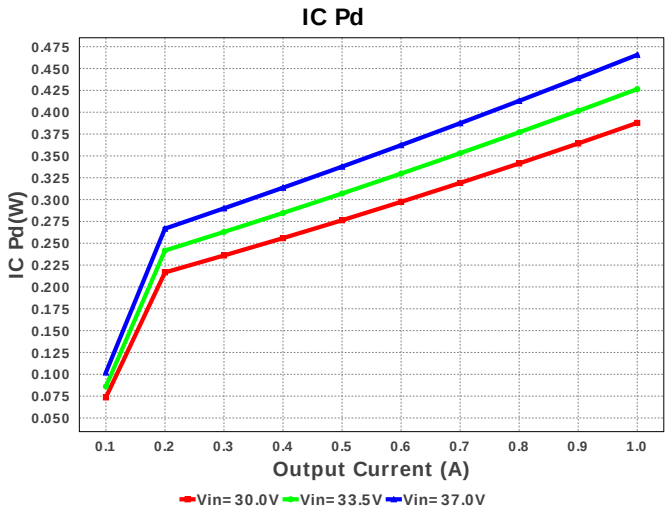


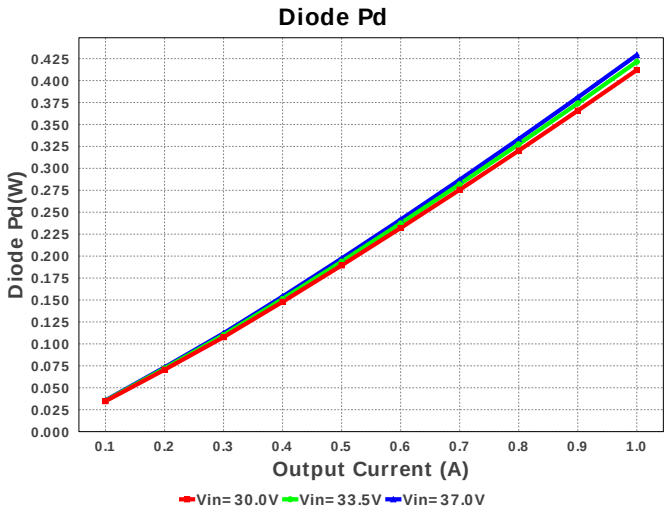


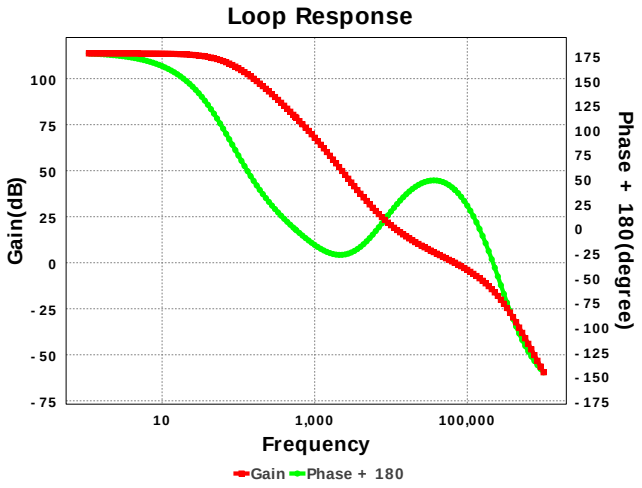












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	354.112 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	69.958 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	82.505 mA	Current	Output capacitor_x RMS ripple current
4.	IC Ipk	1.264 A	Current	Peak switch current in IC
5.	Iin Avg	160.95 mA	Current	Average input current
6.	L Ipp	528.15 mA	Current	Peak-to-peak inductor ripple current
7.	M1 Irms	383.409 mA	Current	Q Iavg
8.	BOM Count	11	General	Total Design BOM count
9.	FootPrint	255.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	592.527 kHz	General	Switching frequency
11.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	63.611 mV	General	Voltage drop across the MosFET
13.	Pout	5.0 W	General	Total output power
14.	Total BOM	$2.52	General	Total BOM Cost
15.	D1 Tj	40.727 degC	Op_Point	D1 junction temperature
16.	Vout Actual	5.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	101.923 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	14.698 %	Op_point	Duty cycle
20.	Efficiency	83.966 %	Op_point	Steady state efficiency
21.	IC Tj	49.557 degC	Op_point	IC junction temperature
22.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	1.0 A	Op_point	Iout operating point
24.	Phase Marg	59.797 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	37.0 V	Op_point	Vin operating point
26.	Vout p-p	13.363 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	557.759 µW	Power	Input capacitor power dissipation
28.	Cout Pd	342.589 µW	Power	Output capacitor power dissipation
29.	Coutx Pd	35.166 µW	Power	Output capacitor_x power loss
30.	Diode Pd	429.089 mW	Power	Diode power dissipation
31.	IC Pd	465.638 mW	Power	IC power dissipation
32.	L Pd	58.844 mW	Power	Inductor power dissipation
33.	Total Pd	954.849 mW	Power	Total Power Dissipation
34.	Vout Tolerance	4.158 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	37.0	Maximum input voltage
3.	VinMin	30.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LMR16010P	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR16010P** Product Folder : http://www.ti.com/product/LMR16010 : contains the data sheet and other resources.