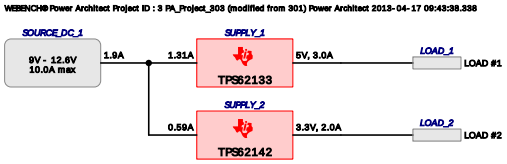
WEBENCH® Power Architect



Project Report

Project : 3698415/3 : PA_Project_303 (modified from 301)
Created : 2013-04-17 09:43:38.338
Optimize project optFactor=3

Project Summary

1.	Total System Efficiency	90.03 %
2.	Total System BOM Count	12.0
3.	Total System Footprint	304.0 mm2
4.	Total System BOM Cost	$3.17
5.	Total System Power Dissipation	2.392 W

--> Launch WEBENCH Power Architect.

Power Supplies

#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	TPS62133	Switcher : 3V-17V,5Vout,3A,DCS-Control,pin selectable frequency	5 V	3.0 A	90.7%	152	$1.71	7	4
2.	SUPPLY_2	TPS62142	Switcher : 3V-17V,3.3Vout,2A,Buck,DCS-Control,pin selectable frequency	3.3 V	2.0 A	88.5%	152	$1.46	8	9

Power Loads

#	Name	VLoad	ILoad	Description
1.	LOAD #1	5 V	3 A	VoutRipple=1%
2.	LOAD #2	3.3 V	2 A	VoutRipple=1%

Project Diagram

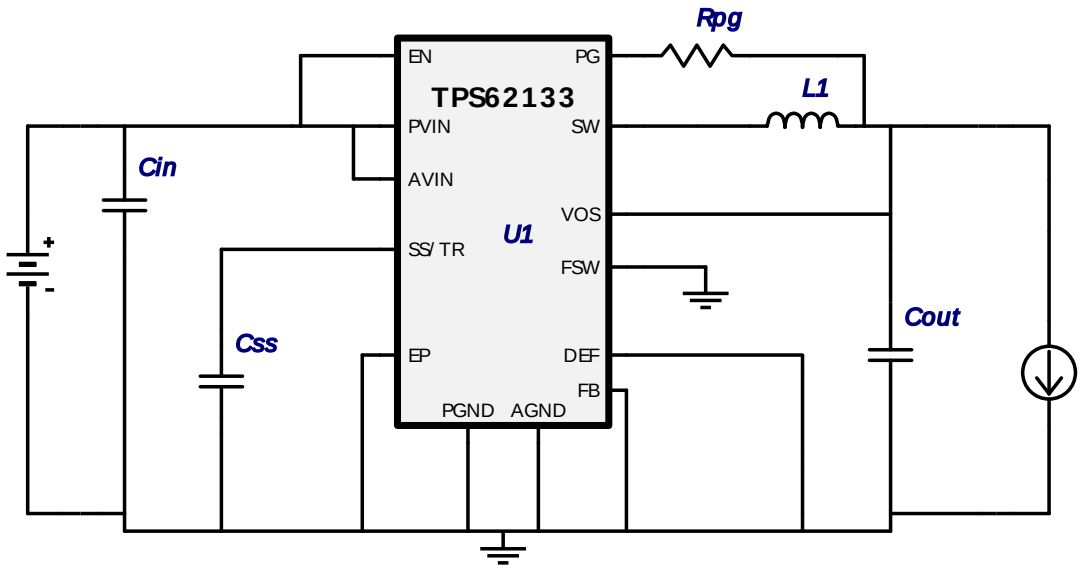
Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm^2)
Kemet	C0805C332K5RACTU	0805	2	$0.01	26
TDK	C2012X5R0J226M	0805	1	$0.06	13
Vishay-Dale	CRCW0402100KFKED	0402	2	$0.01	15
MuRata	GRM31CR61E106KA12L	1206	2	$0.07	37
Taiyo Yuden	LMK212BJ226MG-T	0805	1	$0.12	13
Bourns	SRN6045-2R2Y	SRN6045	1	$0.16	64
Texas Instruments	TPS62133RGTR	S-PVQFN-N16	1	$1.30	36
Texas Instruments	TPS62142RGTR	S-PVQFN-N16	1	$1.15	36
TDK	VLC6045T-2R2N	VLC6045	1	$0.20	64
Total			**12**	**$3.17**	**304**

Device = TPS62133RGTR
Topology = unknown
Created = 4/17/13 9:43:36 AM

WEBENCH® Design Report

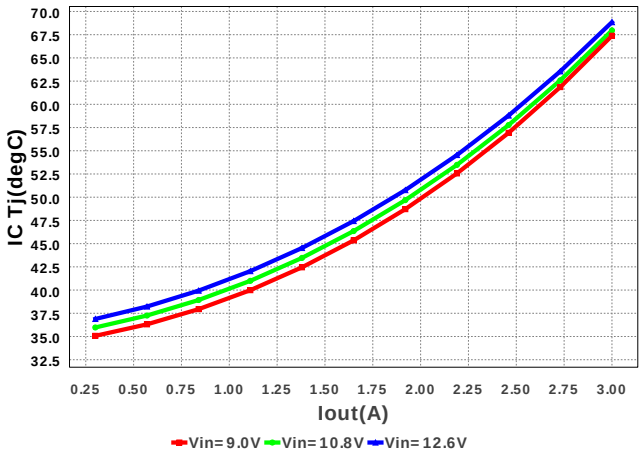
Design : 3698415/7 TPS62133RGTR
TPS62133RGTR 9.0V-12.6V to 5.0V @ 3.0A



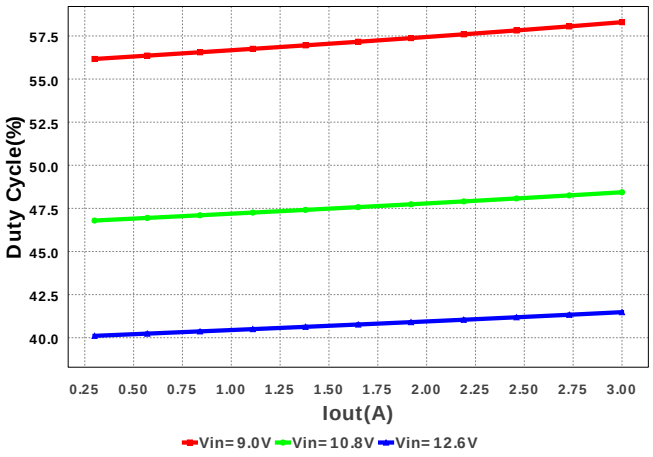
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM31CR61E106KA12L Series= X5R	Cap= 10.0 µF ESR= 4.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.07	1206 19mm2
2.	Cout	Taiyo Yuden	LMK212BJ226MG-T Series= X5R	Cap= 22.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.12	0805 13mm2
3.	Css	Kemet	C0805C332K5RACTU Series= X7R	Cap= 3.3 nF ESR= 332.0 mOhm VDC= 50.0 V IRMS= 319.0 mA	1	$0.01	0805 13mm2
4.	L1	TDK	VLC6045T-2R2N	L= 2.2 µH DCR= 17.0 mOhm	1	$0.20	VLC6045 64mm2
5.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
6.	U1	Texas Instruments	TPS62133RGTR	Switcher	1	$1.30	S-PVQFN-N16 36mm2

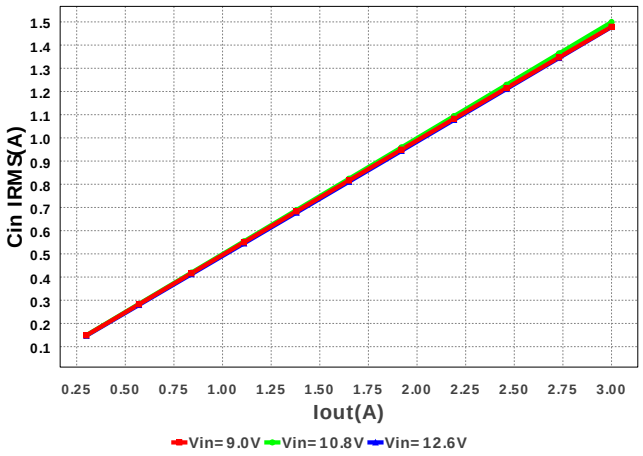
IC Tj



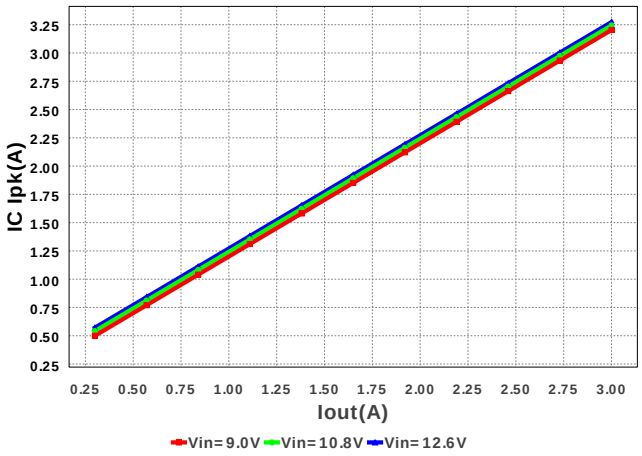
Duty Cycle



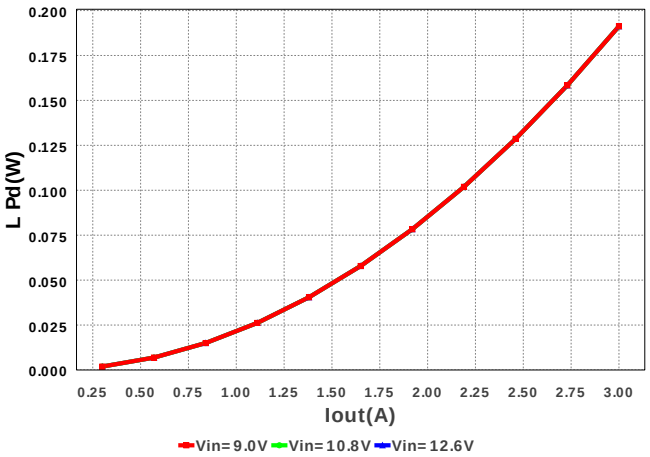
Cin IRMS



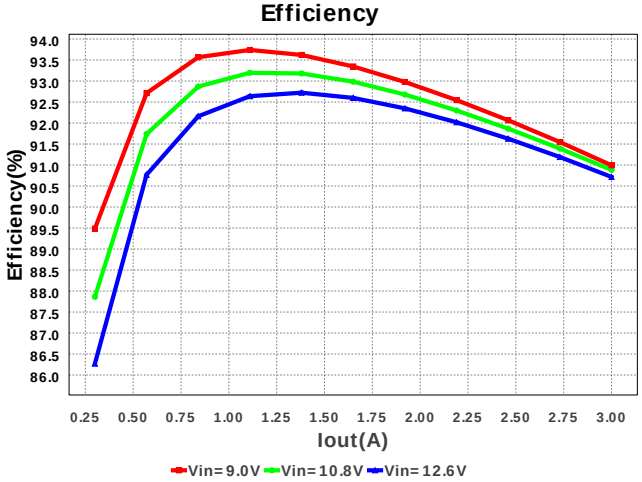
IC Ipk



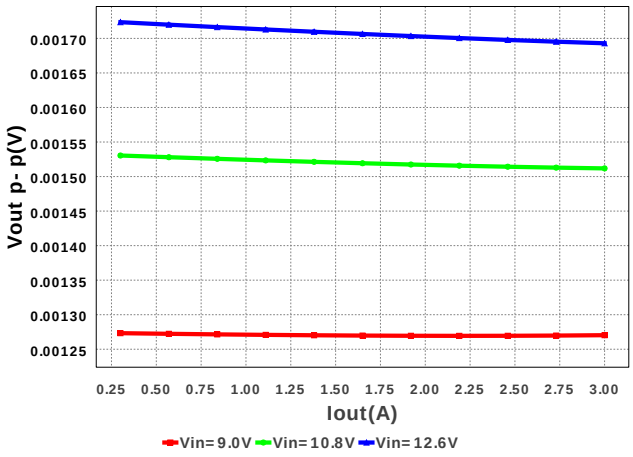
L Pd



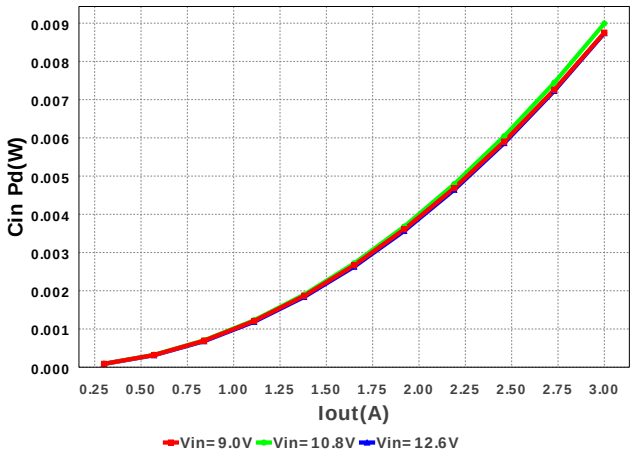
Efficiency



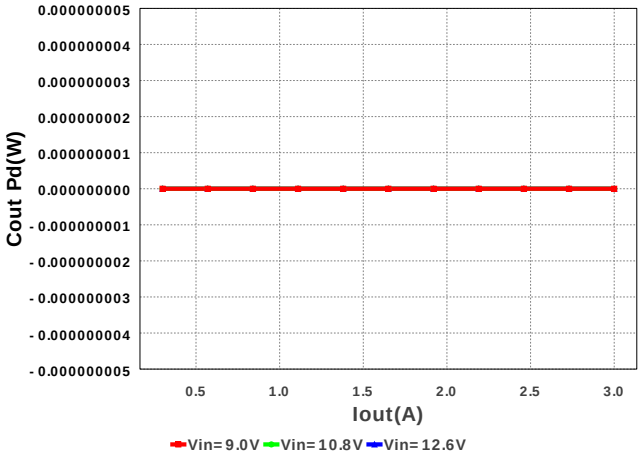
Vout p- p



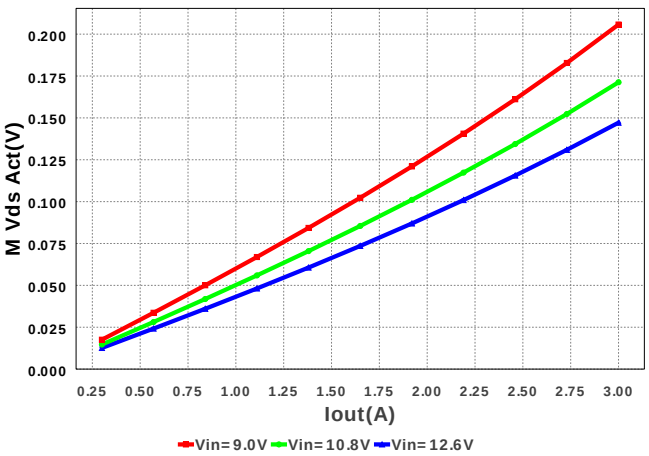
Cin Pd



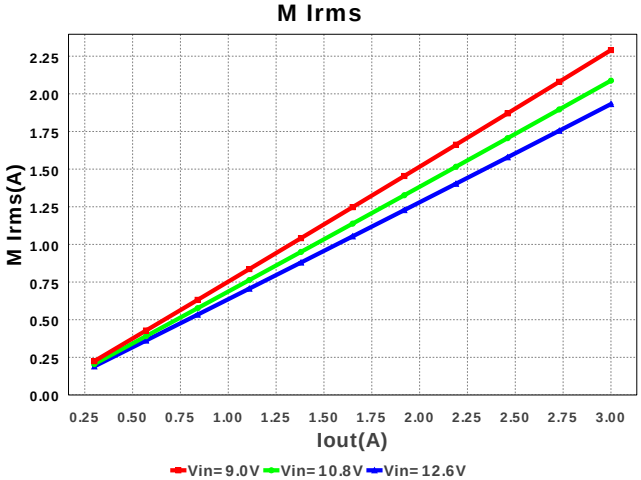
Cout Pd



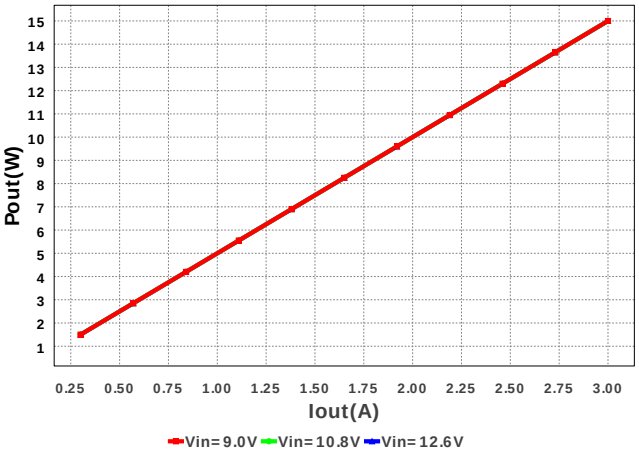
M Vds Act

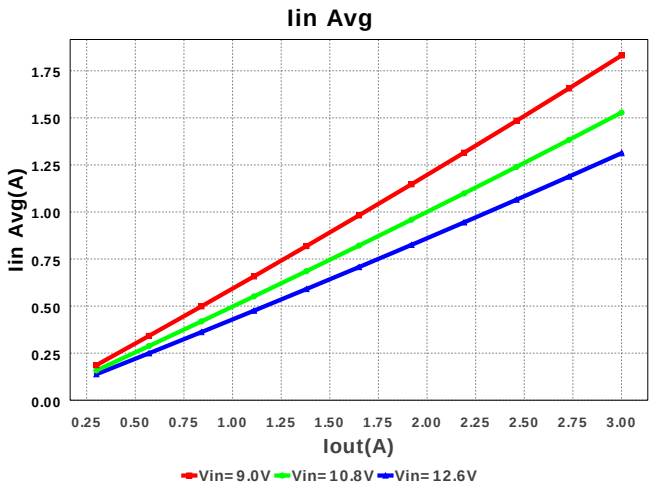


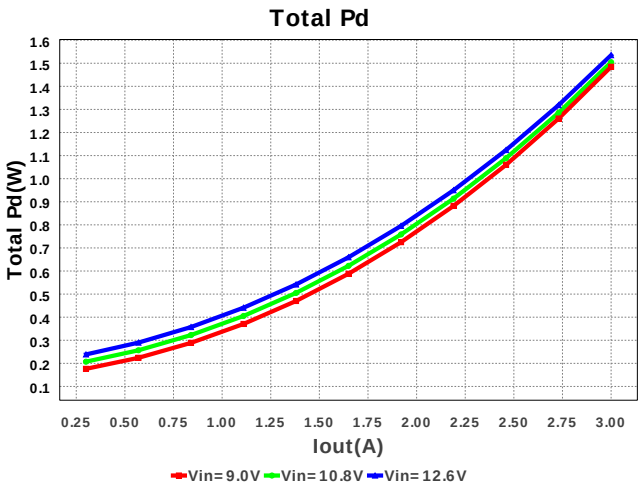
M Irms

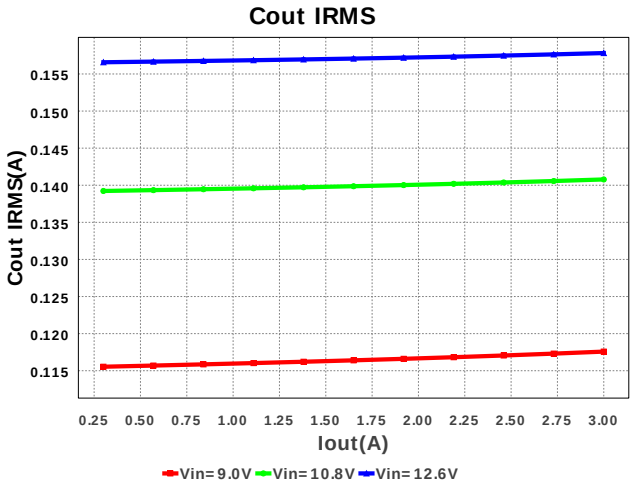


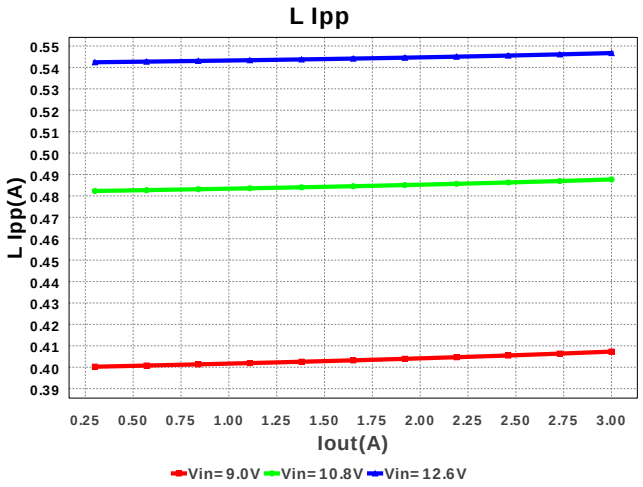
Pout

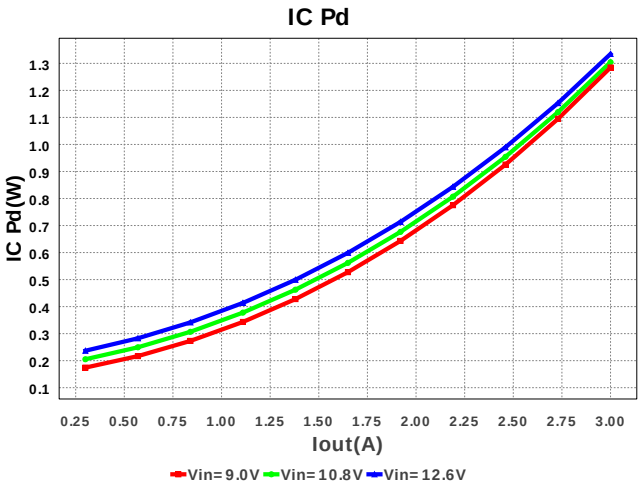


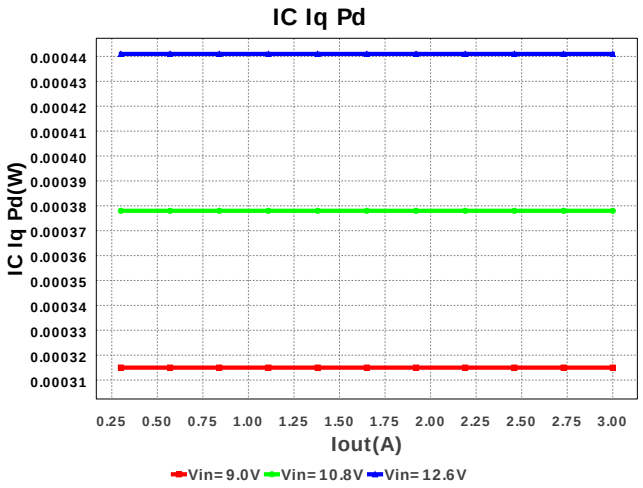












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.478 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	157.818 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	3.273 A	Current	Peak switch current in IC
4.	Iin Avg	1.312 A	Current	Average input current
5.	L Ipp	546.697 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.932 A	Current	Q Iavg
7.	BOM Count	6	General	Total Design BOM count
8.	FootPrint	152.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	2.621 MHz	General	Switching frequency
10.	IC Tolerance	90.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	147.142 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Mode	CCM	General	Conduction Mode
13.	Pout	15.0 W	General	Total output power
14.	Total BOM	$1.71	General	Total BOM Cost
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	41.481 %	Op_point	Duty cycle
17.	Efficiency	90.717 %	Op_point	Steady state efficiency
18.	IC Tj	68.846 degC	Op_point	IC junction temperature
19.	ICThetaJA	29.1 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	3.0 A	Op_point	Iout operating point
21.	VIN_OP	12.6 V	Op_point	Vin operating point
22.	Vout p-p	1.693 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	8.739 mW	Power	Input capacitor power dissipation
24.	Cout Pd	0.0 W	Power	Output capacitor power dissipation
25.	IC Pd	1.335 W	Power	IC power dissipation
26.	L Pd	191.25 mW	Power	Inductor power dissipation
27.	Total Pd	1.535 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	3.0 A	Maximum Output Current
2.	Iout1	3.0 Amps	Output Current #1
3.	VinMax	12.6 V	Maximum input voltage
4.	VinMin	9.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	TPS62133	National Based Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

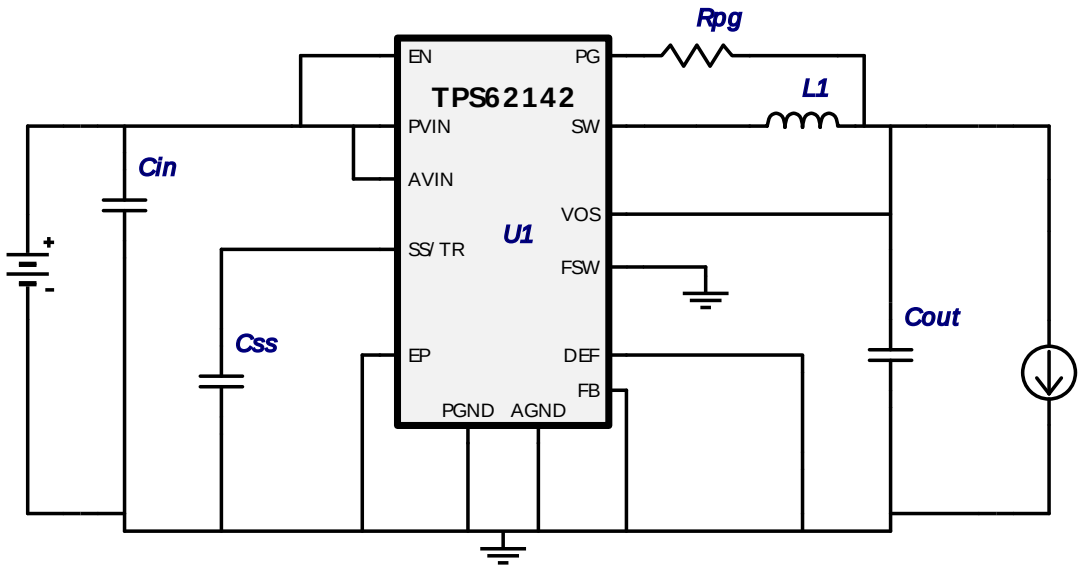
1. Feature Highlights: DCS-Control(TM) Architecture with upto 3A output current, 3V to 17V Input Voltage Range, 5.0V Fixed Output voltageSelectable operating frequency, Optional Softstart Capacitor for slow startup, Tracking,Pin selectable output voltage (nominal, +5%) Seamless Power Save Mode for Light Load Efficiency, Power Good Output, 100% Duty Cycle mode, Short Circuit Protection, Thermal Shutdown

2. **TPS62133** Product Folder : http://www.ti.com/product/tps62133 : contains the data sheet and other resources.

Device = TPS62142RGTR
Topology = unknown
Created = 4/17/13 9:43:37 AM

WEBENCH® Design Report

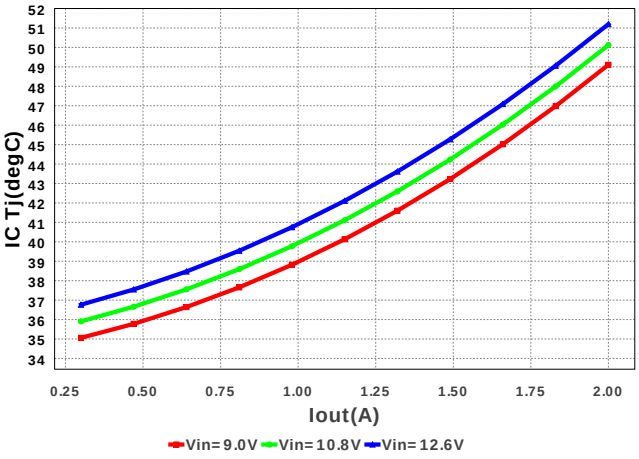
Design : 3698415/8 TPS62142RGTR
TPS62142RGTR 9.0V-12.6V to 3.3V @ 2.0A



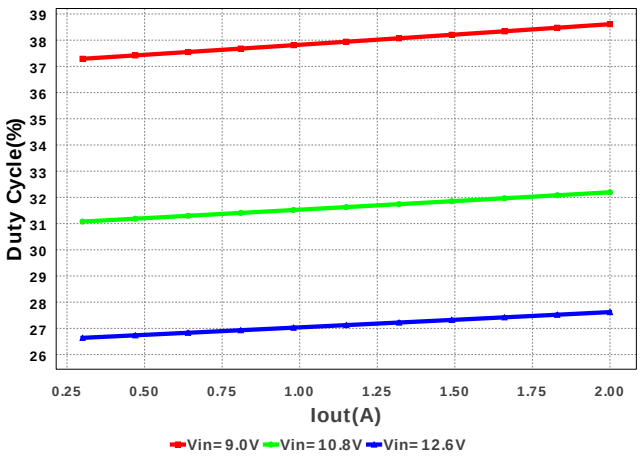
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM31CR61E106KA12L Series= X5R	Cap= 10.0 µF ESR= 4.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.07	1206 19mm2
2.	Cout	TDK	C2012X5R0J226M Series= X5R	Cap= 22.0 µF ESR= 1.8 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.06	0805 13mm2
3.	Css	Kemet	C0805C332K5RACTU Series= X7R	Cap= 3.3 nF ESR= 332.0 mOhm VDC= 50.0 V IRMS= 319.0 mA	1	$0.01	0805 13mm2
4.	L1	Bourns	SRN6045-2R2Y	L= 2.2 µH DCR= 25.1 mOhm	1	$0.16	SRN6045 64mm2
5.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 8mm2
6.	U1	Texas Instruments	TPS62142RGTR	Switcher	1	$1.15	S-PVQFN-N16 36mm2

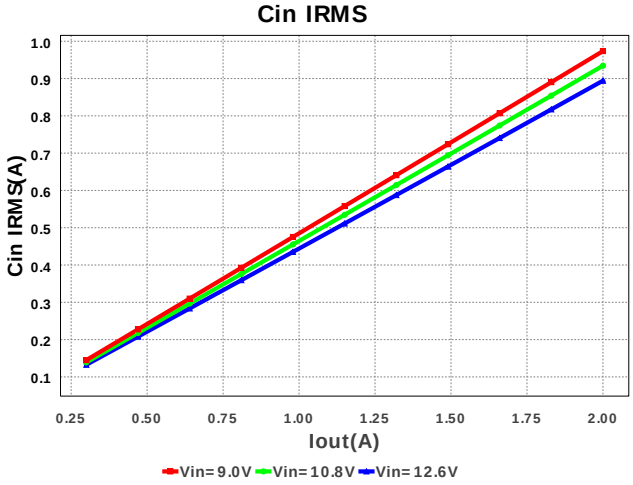
IC Tj



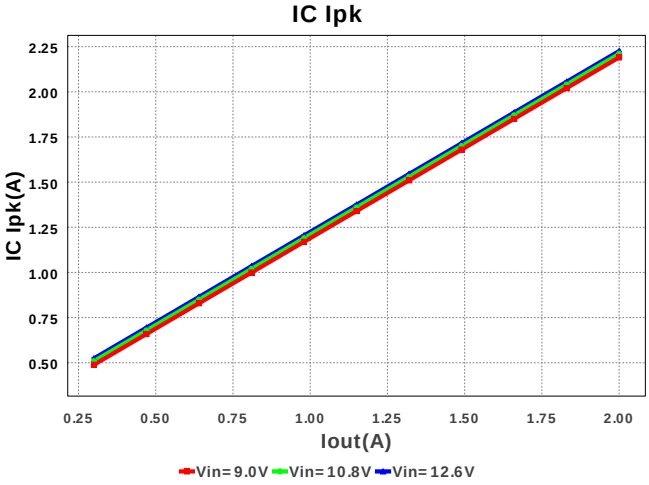
Duty Cycle



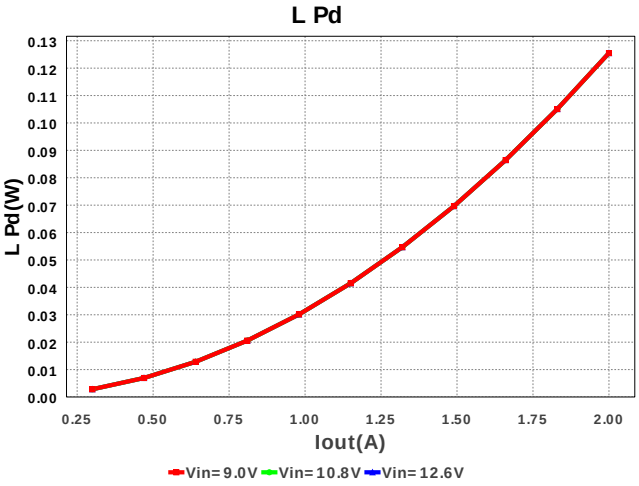
Cin IRMS



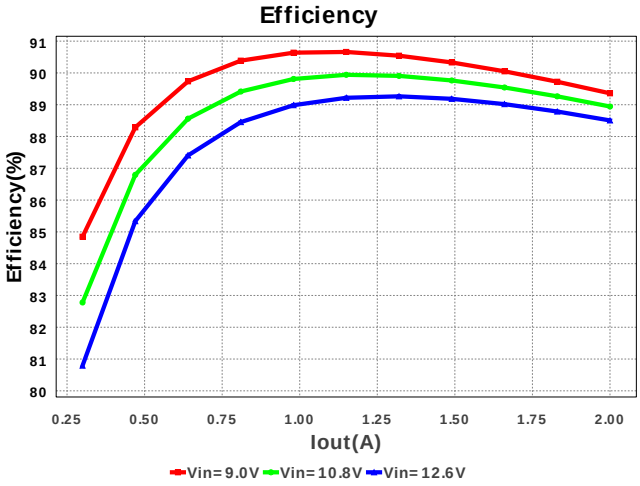
IC Ipk

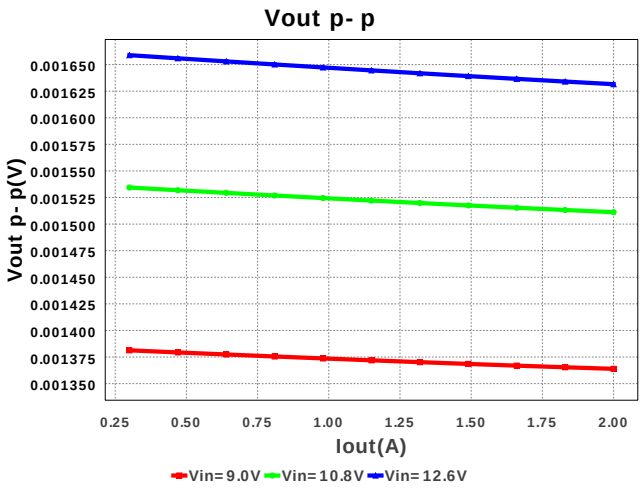


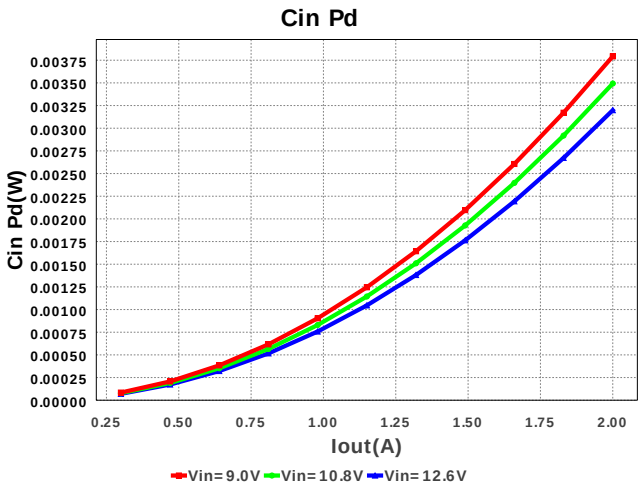
L Pd

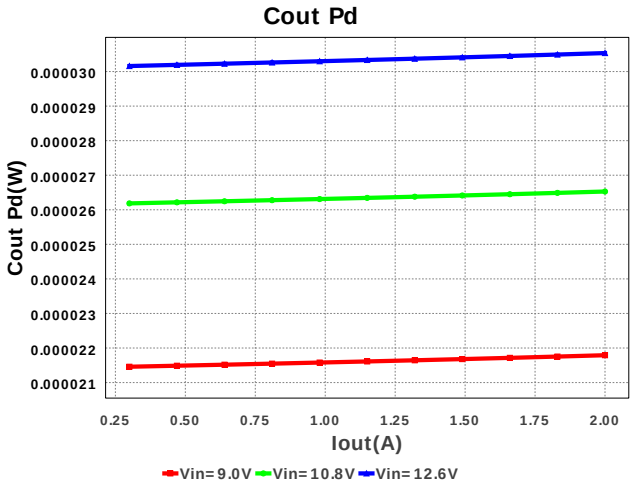


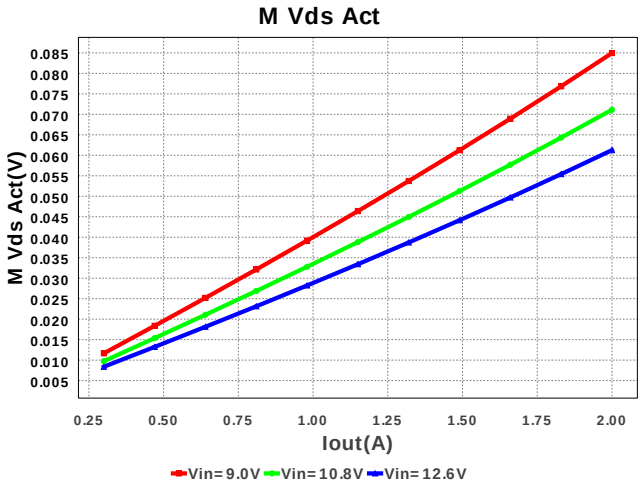
Efficiency

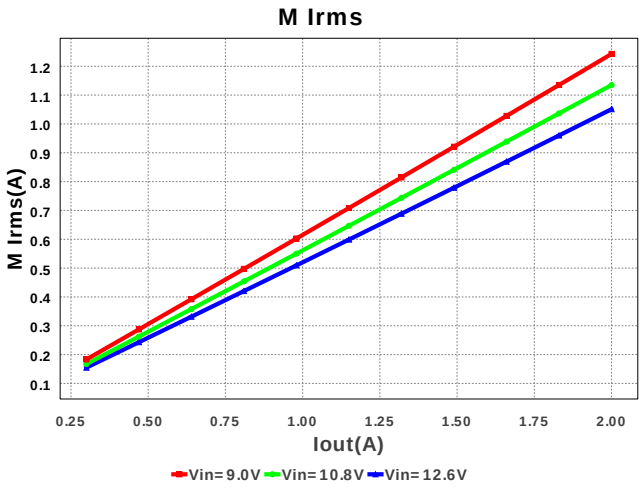


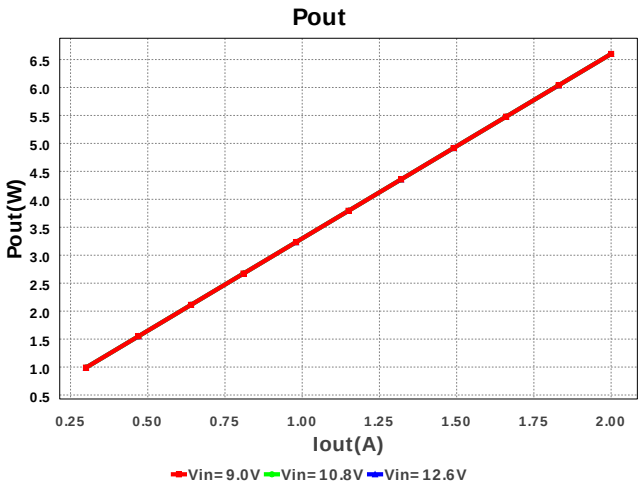


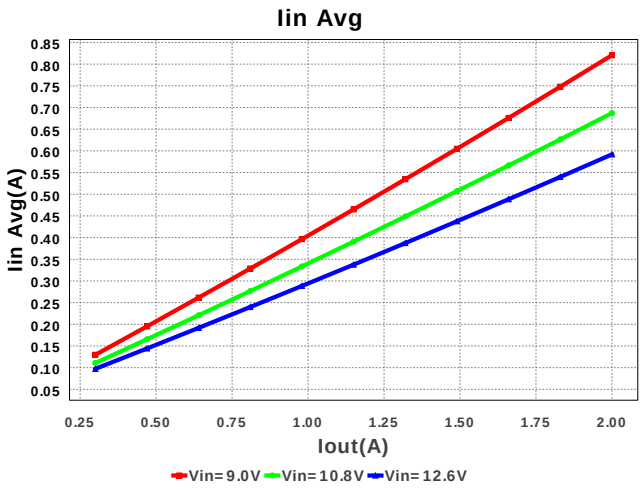


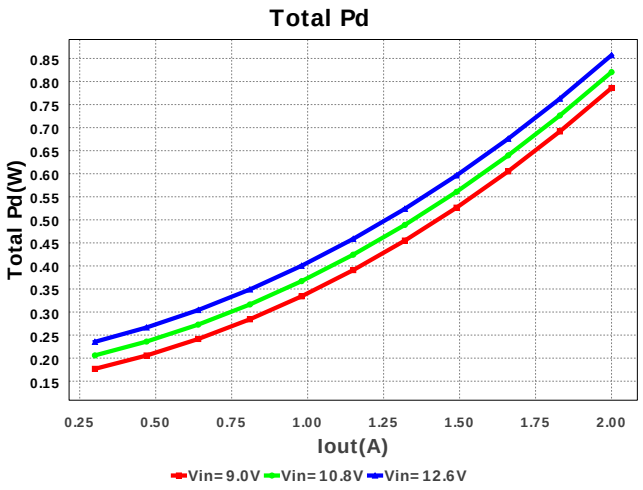


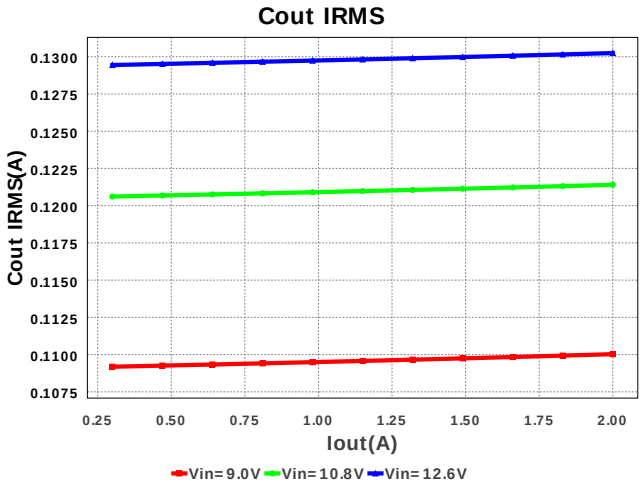


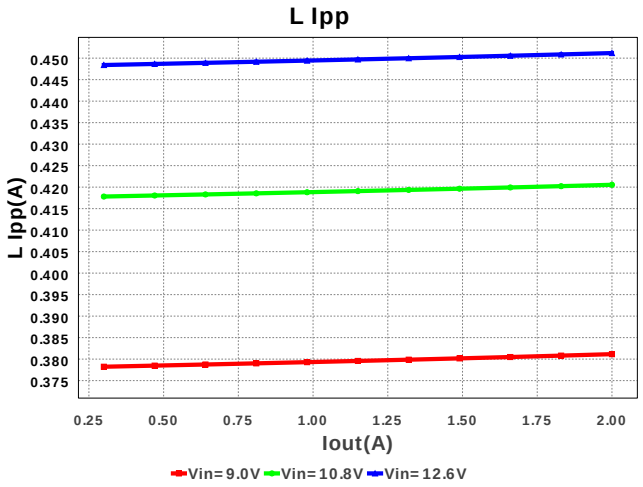


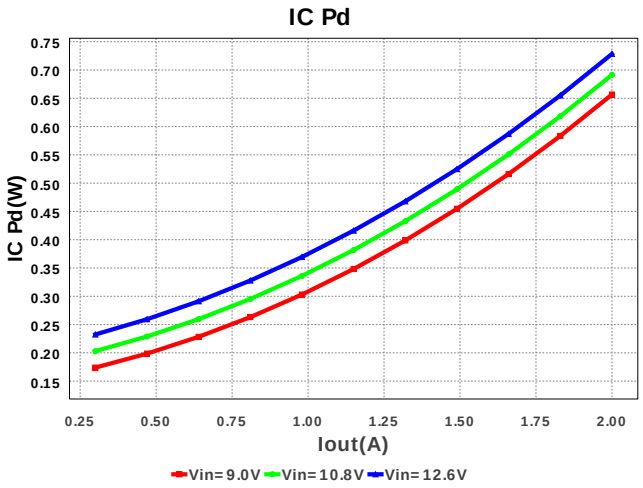


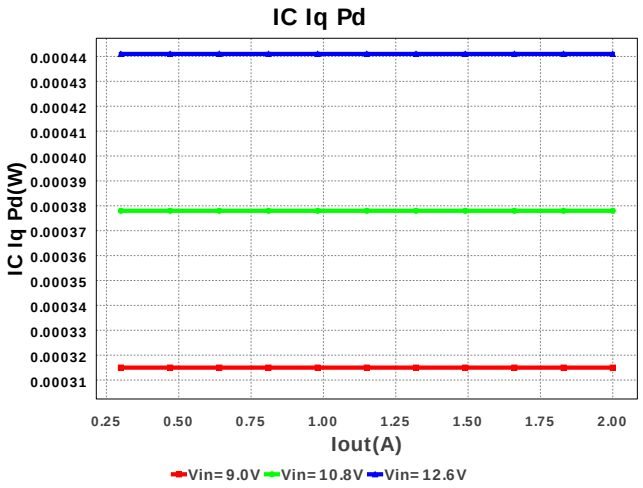












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	894.252 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	130.245 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.226 A	Current	Peak switch current in IC
4.	Iin Avg	591.83 mA	Current	Average input current
5.	L Ipp	451.181 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.051 A	Current	Q Iavg
7.	BOM Count	6	General	Total Design BOM count
8.	FootPrint	152.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	2.588 MHz	General	Switching frequency
10.	IC Tolerance	59.4 mV	General	IC Feedback Tolerance
11.	M Vds Act	61.264 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Mode	CCM	General	Conduction Mode
13.	Pout	6.6 W	General	Total output power
14.	Total BOM	$1.46	General	Total BOM Cost
15.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	27.622 %	Op_point	Duty cycle
17.	Efficiency	88.506 %	Op_point	Steady state efficiency
18.	IC Tj	51.196 degC	Op_point	IC junction temperature
19.	ICThetaJA	29.1 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	VIN_OP	12.6 V	Op_point	Vin operating point
22.	Vout p-p	1.632 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	3.199 mW	Power	Input capacitor power dissipation
24.	Cout Pd	30.535 µW	Power	Output capacitor power dissipation
25.	IC Pd	728.385 mW	Power	IC power dissipation
26.	L Pd	125.5 mW	Power	Inductor power dissipation
27.	Total Pd	857.114 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	12.6 V	Maximum input voltage
4.	VinMin	9.0 V	Minimum input voltage
5.	Vout	3.3 V	Output Voltage
6.	Vout1	3.3 Volt	Output Voltage #1
7.	base_pn	TPS62142	National Based Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. Feature Highlights: DCS-Control(TM) Architecture with upto 2A output current, 3V to 17V Input Voltage Range, 3.3V Fixed Output voltageSelectable operating frequency, Optional Softstart Capacitor for slow startup, Tracking,Pin selectable output voltage (nominal, +5%) Seamless Power Save Mode for Light Load Efficiency, Power Good Output, 100% Duty Cycle mode, Short Circuit Protection, Thermal Shutdown

2. **TPS62142** Product Folder : http://www.ti.com/product/tps62142 : contains the data sheet and other resources.