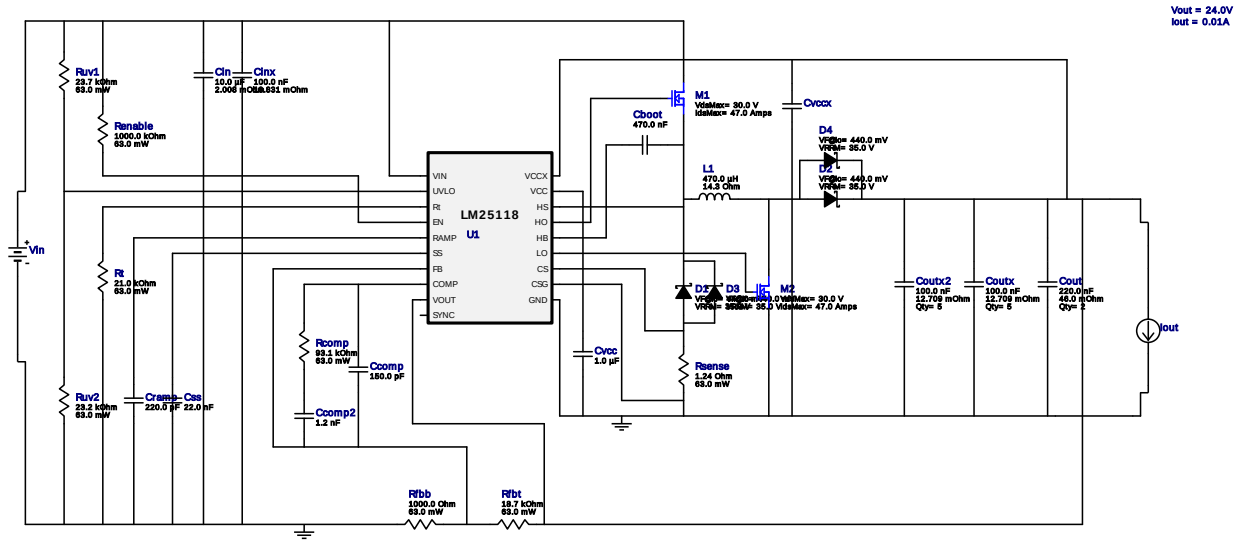
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 22.0V
Vout = 24.0V
Iout = 0.01A

Device = LM25118MH/NOPB
Topology = Buck_Boost
Created = 2/4/16 7:03:19 AM
BOM Cost = $4.78
BOM Count = 36
Total Pd = 0.0W

Design : 4461414/59 LM25118MH/NOPB
LM25118MH/NOPB 3.0V-22.0V to 24.00V @ 0.01A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
2.	Ccomp	AVX	0101YA150JAT2A Series= C0G/NP0	Cap= 150.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.04	01005 2 mm^2
3.	Ccomp2	MuRata	GRM033R71C122KA01D Series= X7R	Cap= 1.2 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
4.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	1	$0.25	1210_280 15 mm^2
5.	Cinx	TDK	C1005X7R1H104K Series= X7R	Cap= 100.0 nF ESR= 19.831 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.02	1005 3 mm^2
6.	Cout	Kemet	C0805C224K5RACTU Series= X7R	Cap= 220.0 nF ESR= 46.0 mOhm VDC= 50.0 V IRMS= 2.65 A	2	$0.02	0805 7 mm^2
7.	Coutx	TDK	C2012X8R1H104K Series= X8R	Cap= 100.0 nF ESR= 12.709 mOhm VDC= 50.0 V IRMS= 0.0 A	5	$0.07	0805 7 mm^2
8.	Coutx2	TDK	C2012X8R1H104K Series= X8R	Cap= 100.0 nF ESR= 12.709 mOhm VDC= 50.0 V IRMS= 0.0 A	5	$0.07	0805 7 mm^2
9.	Cramp	MuRata	GRM033R71C221KA01D Series= X7R	Cap= 220.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2

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#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Css	MuRata	GRM033C80J223KE01D Series= X6S	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
11.	Cvcc	Kemet	C0603C105K8PACTU Series= X5R	Cap= 1.0 uF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
12.	D1	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm²
13.	D2	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm²
14.	D3	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm²
15.	D4	Bourns	CD0603-B0130L	VF@Io= 440.0 mV VRRM= 35.0 V	1	$0.09	Diode_0603 5 mm²
16.	L1	Bourns	SDR0302-471KL	L= 470.0 µH DCR= 14.3 Ohm	1	$0.18	SDR0302 15 mm²
17.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 47.0 Amps	1	$0.34	TRANS_NexFET_Q3 18 mm²
18.	M2	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 47.0 Amps	1	$0.34	TRANS_NexFET_Q3 18 mm²
19.	Rcomp	Vishay-Dale	CRCW040293K1FKED Series= CRCW..e3	Res= 93.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
20.	Renable	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
21.	Rfbb	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
22.	Rfbt	Vishay-Dale	CRCW040218K7FKED Series= CRCW..e3	Res= 18.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
23.	Rsense	Vishay-Dale	CRCW04021R24FKED Series= CRCW..e3	Res= 1.24 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
24.	Rt	Vishay-Dale	CRCW040221K0FKED Series= CRCW..e3	Res= 21.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
25.	Ruv1	Vishay-Dale	CRCW040223K7FKED Series= CRCW..e3	Res= 23.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
26.	Ruv2	Vishay-Dale	CRCW040223K2FKED Series= CRCW..e3	Res= 23.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
27.	U1	Texas Instruments	LM25118MH/NOPB	Switcher	1	$2.40	MXA20A 71 mm²

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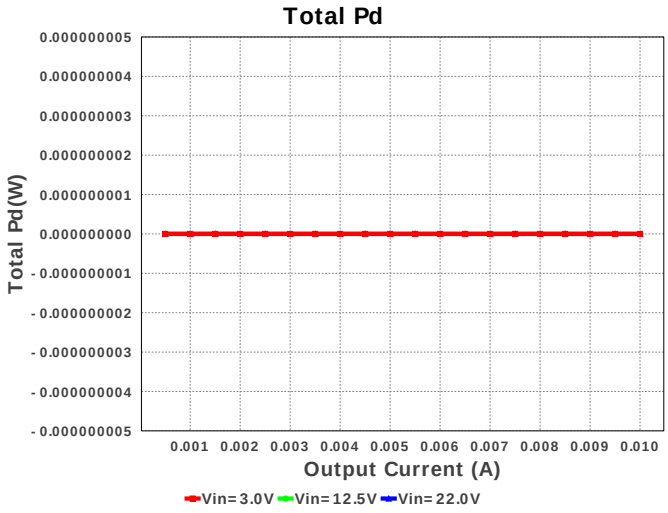

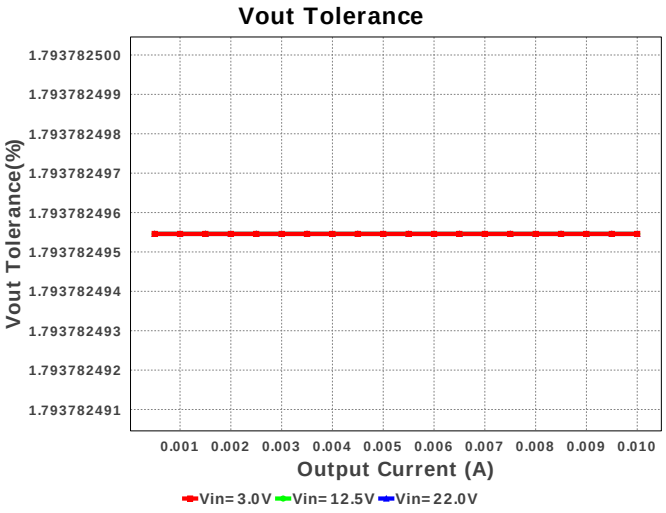

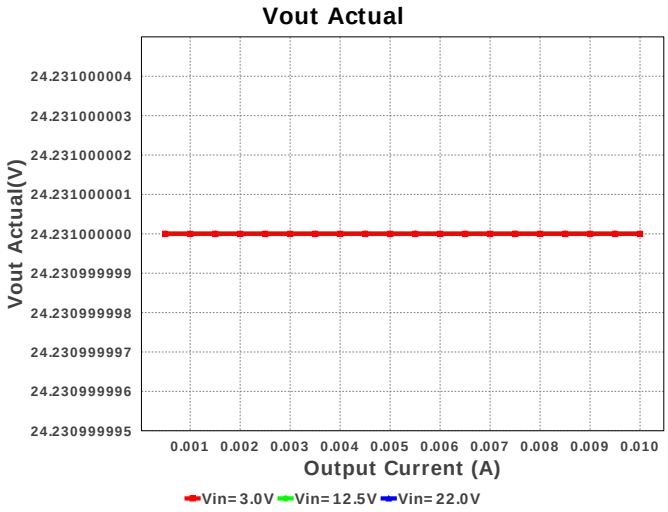

Operating Values

#	Name	Value	Category	Description
1.	BOM Count	36	General	Total Design BOM count
2.	FootPrint	282.0 mm^2	General	Total Foot Print Area of BOM components
3.	Frequency	266.445 kHz	General	Switching frequency
4.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
5.	Total BOM	$4.78	General	Total BOM Cost
6.	Low Freq Gain	95.932 dB	Op_Point	Gain at 10Hz
7.	Vout Actual	24.231 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
8.	Cross Freq	5.333 kHz	Op_point	Bode plot crossover frequency
9.	Gain Marg	-6.071 dB	Op_point	Bode Plot Gain Margin
10.	IOUT_OP	10.0 mA	Op_point	Iout operating point
11.	Phase Marg	28.876 deg	Op_point	Bode Plot Phase Margin
12.	VIN_OP	22.0 V	Op_point	Vin operating point
13.	Total Pd	0.0 W	Power	Total Power Dissipation
14.	Vout Tolerance	1.794 %	Unknown	Vout Tolerance based on IC Tolerance and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	10.0 m	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	3.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM25118	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. The LM25118 is a wide range buck-boost controller which is operable in an ultra wide input range of 3 to 75V. A buck-boost regulator can maintain regulation for input voltages either higher or lower than the output voltage. The challenge is that buck-boost power converters are not

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as efficient as buck regulators. The LM5118 has been designed as a dual mode controller whereby the power converter acts as a buck regulator while the input voltage is above the output. As the input voltage approaches the output voltage, a gradual transition to the buck-boost mode occurs. This gradual transition between modes eliminates disturbances at the output during transitions.

2. **LM25118** Product Folder : http://www.ti.com/product/LM25118 : contains the data sheet and other resources.

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