

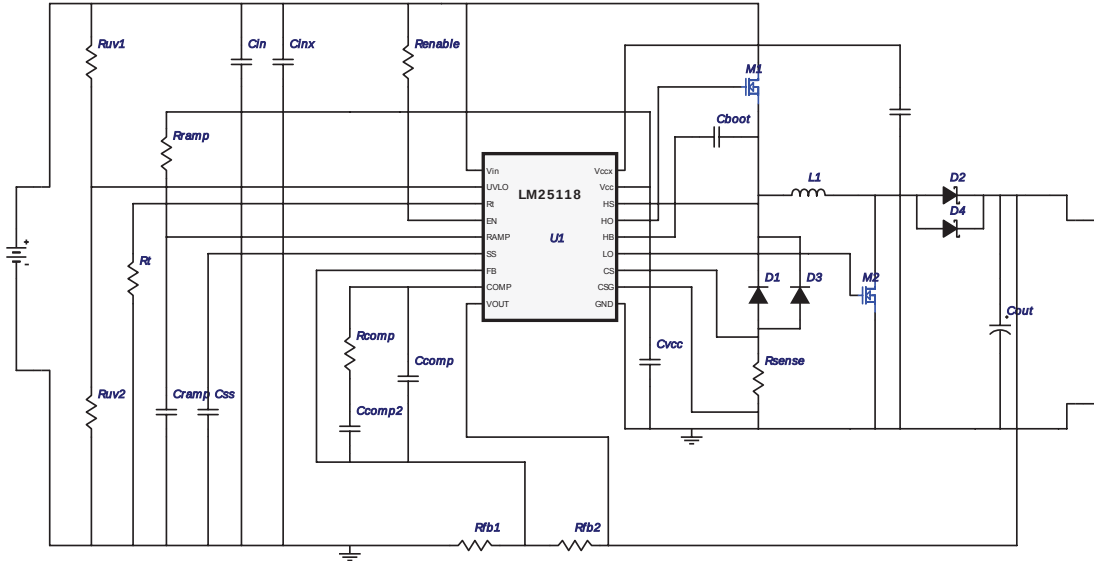


VinMin = 10.0V
 VinMax = 40.0V
 Vout = 24.0V
 Iout = 2.2A

Device = LM25118MH/NOPB
 Topology = Buck_Boost
 Created = 11/1/12 3:28:05 AM
 BOM Cost = \$35.79
 Total Pd = 3.54 W
 Footprint = 2,182.0 mm²
 BOM Count = 2

WEBENCH® Design Report

Design : 2303220/59 LM25118MH/NOPB
 LM25118MH/NOPB 10.0V-40.0V to 24.0V @ 2.2A



Electrical BOM

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
1.	Cboot	MuRata	GRM21BR71E104KA01L Series= X7R	1	\$0.01	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	 0805 13mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB152 Series= X7R	1	\$0.01	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2
3.	Ccomp2	MuRata	GRM216R71H103KA01D Series= X7R	1	\$0.01	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2
4.	Cin	TDK	C5750X7R1H106M Series= X7R	4	\$0.68	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 5.5 A	 2220 60mm2
5.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	1	\$0.01	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	 0805 13mm2
6.	Cout	Kemet	T495X156K050ATE300 Series= T495	11	\$2.27	Cap= 15.0 µF ESR= 300.0 mOhm VDC= 50.0 V IRMS= 667.0 mA	 7343-43 59mm2
7.	Cramp	Yageo America	CC0805KRX7R9BB152 Series= X7R	1	\$0.01	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2
8.	Css	MuRata	GRM216R71H103KA01D Series= X7R	1	\$0.01	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2
9.	Cvcc	MuRata	GRM155R61A105KE15D Series= X5R	1	\$0.01	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	 0402 8mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
10.	D1	Diodes Inc.	B550C-13-F	1	\$0.33	VF@Io= 700.0 mV VRRM= 50.0 V	 SMC 83mm2
11.	D2	Vishay-Semiconductor	MBRB745PBF	1	\$0.67	VF@Io= 700.0 mV VRRM= 45.0 V	 DDPAK 210mm2
12.	D3	Diodes Inc.	B550C-13-F	1	\$0.33	VF@Io= 700.0 mV VRRM= 50.0 V	 SMC 83mm2
13.	D4	Vishay-Semiconductor	MBRB745PBF	1	\$0.67	VF@Io= 700.0 mV VRRM= 45.0 V	 DDPAK 210mm2
14.	L1	Vishay-Dale	IHLP6767GZER330M11	1	\$2.64	L= 33.0 µH DCR= 37.0 mOhm	 IHLP-6767GZ 367mm2
15.	M1	AOS	AON6242	1	\$0.82	VdsMax= 60.0 V IdsMax= 18.5 Amps	 TRANS_AOS_DFN5X6 56mm2
16.	M2	Texas Instruments	CSD17308Q3	1	\$0.34	VdsMax= 30.0 V IdsMax= 47.0 Amps	 TRANS_NexFET_Q3 29mm2
17.	Rcomp	Vishay-Dale	CRCW040226K7FKED Series= CRCW..e3	1	\$0.01	Res= 26.7 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
18.	Renable	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	1	\$0.01	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
19.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	1	\$0.01	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
20.	Rfb2	Vishay-Dale	CRCW040218K7FKED Series= CRCW..e3	1	\$0.01	Res= 18.7 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
21.	Rramp	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	1	\$0.01	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
22.	Rsense	Stackpole Electronics Inc	CSRN2512FK20L0 Series= ?	1	\$0.15	Res= 20.0 mOhm Power= 2.0 W Tolerance= 1.0%	 2512 43mm2
23.	Rt	Vishay-Dale	CRCW040251K1FKED Series= CRCW..e3	1	\$0.01	Res= 51.1 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
24.	Ruv1	Vishay-Dale	CRCW040243K2FKED Series= CRCW..e3	1	\$0.01	Res= 43.2 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
25.	Ruv2	Vishay-Dale	CRCW04027K68FKED Series= CRCW..e3	1	\$0.01	Res= 7.68 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
26.	U1	Texas Instruments	LM25118MH/NOPB	1	\$2.00	Switcher	 MXA20A 71mm2

Operating Values

#	Name	Value	Category	Description
1.	Total BOM	\$35.79		Total BOM Cost
2.	Cin IRMS	1.075 A	Current	Input capacitor RMS ripple current
3.	Cout IRMS	718.429 m A	Current	Output capacitor RMS ripple current
4.	Iin Avg	1.408 A	Current	Average input current
5.	L Ipp	2.489 A	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	2.314 A	Current	Inductor ripple current
7.	M1 Irms	1.714 A	Current	MOSFET RMS ripple current
8.	SW Ipk	3.444 A	Current	Peak switch current
9.	BOM Count	2.0	General	Total Design BOM count
10.	FootPrint	2.182 k mm2	General	Total Foot Print Area of BOM components
11.	Frequency	118.256 k Hz	General	Switching frequency
12.	IC Tolerance	18.0 m V	General	IC Feedback Tolerance
13.	M1 Rdson	4.5 m Ohm	General	Drain-Source On-resistance
14.	M1 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Mode	CCM	General	Conduction Mode
16.	Pout	52.8 W	General	Total output power
17.	D1 Tj	60.13 degC	Op_Point	D1 junction temperature
18.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	4.406 k Hz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	60.7 %	Op_point	Duty cycle
21.	Efficiency	93.716 %	Op_point	Steady state efficiency
22.	IC Tj	90.045 degC	Op_point	IC junction temperature
23.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	2.2 A	Op_point	Iout operating point
25.	M1 TjOP	46.493 degC	Op_point	MOSFET junction temperature
26.	Operating Topology	Buck	Op_point	The current operating topology of the device
27.	Phase Marg	48.953 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	40.0 V	Op_point	Vin operating point
29.	Vout p-p	69.721 m V	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	865.938 μ W	Power	Input capacitor power dissipation
31.	Cout Pd	14.077 m W	Power	Output capacitor power dissipation
32.	Diode Pd	302.608 m W	Power	Diode power dissipation
33.	IC Pd	1.126 W	Power	IC power dissipation
34.	L Pd	223.85 m W	Power	Inductor power dissipation
35.	M1 Pd	26.28 m W	Power	MOSFET power dissipation
36.	M1 PdCond	14.175 m W	Power	M1 MOSFET conduction losses
37.	M1 PdSw	12.104 m W	Power	M1 MOSFET switching losses
38.	Total Pd	3.54 W	Power	Total Power Dissipation
39.	Diode 1 Power Dissipation	302.608 m OpvalUnits.PD	Unknown	Power dissipation in the diode
40.	Diode 2 Power Dissipation	770.0 m OpvalUnits.PD	Unknown	Power dissipation in the diode
41.	Diode 3 Power Dissipation	302.608 m OpvalUnits.PD	Unknown	Power dissipation in the diode
42.	Diode 4 Power Dissipation	770.0 m OpvalUnits.PD	Unknown	Power dissipation in the diode

Design Inputs

#	Name	Value	Description
1.	Iout	2.2 A	Maximum Output Current
2.	Iout1	2.2 Amps	Output Current #1
3.	SoftStart	1.0 ms	Soft Start Time (ms)
4.	VinMax	40.0 V	Maximum input voltage
5.	VinMin	10.0 V	Minimum input voltage
6.	Vout	24.0 V	Output Voltage
7.	Vout1	24.0 Volt	Output Voltage #1
8.	base_pn	LM25118	National Based Product Number
9.	Ta	45.0 degC	Ambient temperature

Design Assistance

1. The LM5118 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 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.