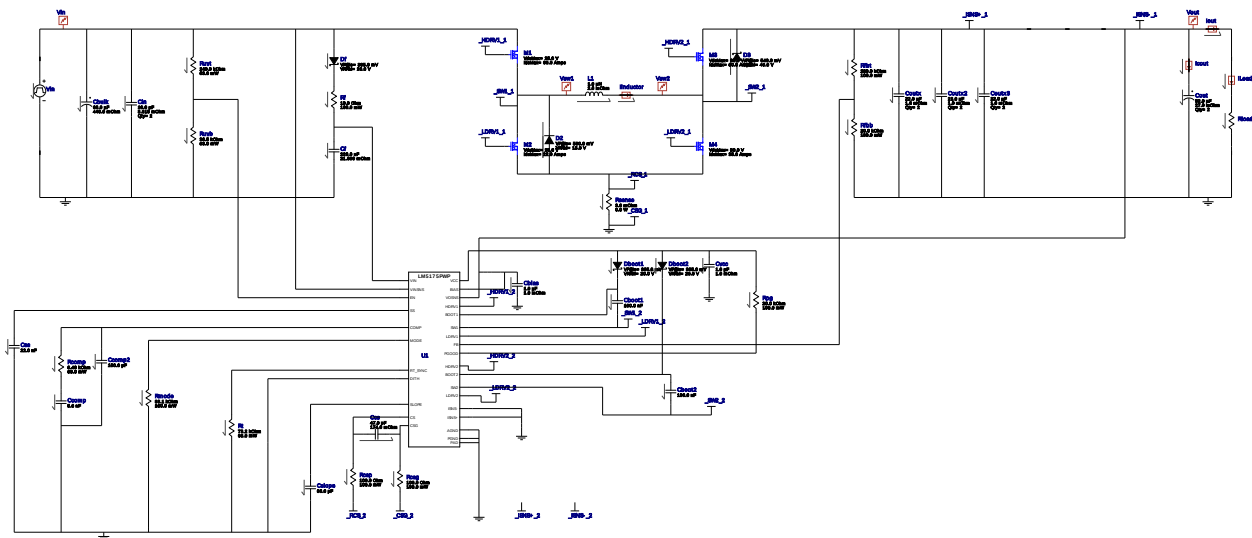


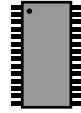
WEBENCH® Electrical Simulation Report



Electrical BOM

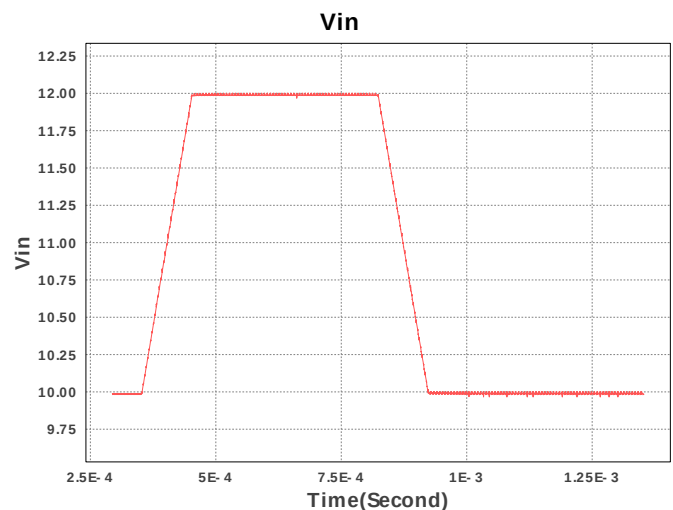
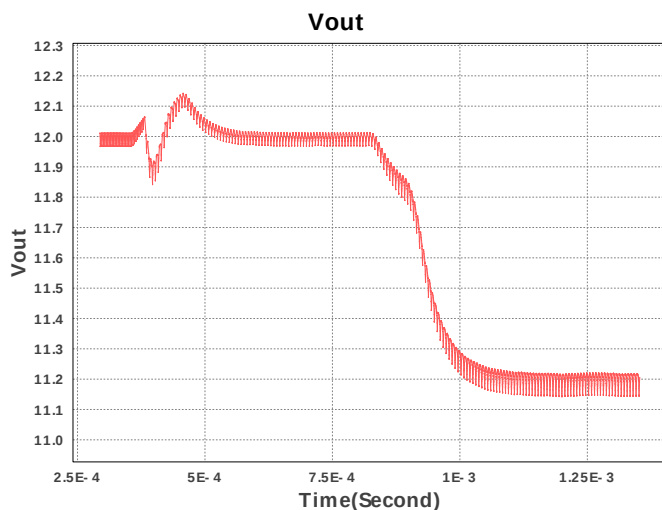
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Taiyo Yuden	TMK212BJ105KG-T Series= X5R	Cap= 1.0 μ F ESR= 1.0 mOhm VDC= 20.0 V IRMS= 0.0 A	1	\$0.03	 0805 7 mm ²
2.	Cboot1	TDK	C3216C0G1H104J160AA Series= C0G/NP0	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.20	 1206 11 mm ²
3.	Cboot2	TDK	C3216C0G1H104J160AA Series= C0G/NP0	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.20	 1206 11 mm ²
4.	Cbulk	Nichicon	UUD1C680MCL1GS Series= uD	Cap= 68.0 μ F ESR= 440.0 mOhm VDC= 16.0 V IRMS= 230.0 mA	1	\$0.11	 SM_RADIAL_6.3AMM 80 mm ²
5.	Ccomp	TDK	CGA4C2C0G1H562J060AA Series= C0G/NP0	Cap= 5.6 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.05	 0805 7 mm ²
6.	Ccomp2	Samsung Electro-Mechanics	CL21C151JBANNNC Series= C0G/NP0	Cap= 150.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
7.	Ccs	AVX	06035A470JAT2A Series= C0G/NP0	Cap= 47.0 pF ESR= 174.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
8.	Cf	TDK	C1608X5R1H224K080AB Series= X5R	Cap= 220.0 nF ESR= 21.699 mOhm VDC= 50.0 V IRMS= 1.125 A	1	\$0.04	 0603 5 mm ²
9.	Cin	MuRata	GRM31CR61C106KA88L Series= X5R	Cap= 10.0 μ F ESR= 3.615 mOhm VDC= 16.0 V IRMS= 3.828 A	2	\$0.10	 1206_190 11 mm ²
10.	Cout	Panasonic	16SVPF82M Series= SVPF	Cap= 82.0 μ F ESR= 27.0 mOhm VDC= 16.0 V IRMS= 3.0 A	2	\$0.37	 CAPSMT_62_E61 53 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Coutx	AVX	12103D226MAT2A Series= X5R	Cap= 22.0 μ F ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	2	\$0.26	 1210 15 mm ²
12.	Coutx2	AVX	12103D226MAT2A Series= X5R	Cap= 22.0 μ F ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	2	\$0.26	 1210 15 mm ²
13.	Coutx3	AVX	12103D226MAT2A Series= X5R	Cap= 22.0 μ F ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	2	\$0.26	 1210 15 mm ²
14.	Cslope	Yageo America	CC0603JRNPO9BN680 Series= C0G/NP0	Cap= 68.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
15.	Css	MuRata	GCM21B5C1H223JA16L Series= C0G/NP0	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.07	 0805 7 mm ²
16.	Cvcc	Taiyo Yuden	EMK107B7105KA-T Series= X7R	Cap= 1.0 μ F ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
17.	D2	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 15.0 V	1	NA	CUSTOM 0 mm ²
18.	D3	Torex USA Corporation	XBS104S13R-G	VF@Io= 540.0 mV VRRM= 40.0 V	1	\$0.13	 SOD-323 9 mm ²
19.	Dboot1	Comchip Technology	CDBK0520L	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
20.	Dboot2	Comchip Technology	CDBK0520L	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
21.	Df	Comchip Technology	CDBK0520L	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
22.	L1	Coilcraft	XAL7070-102MEB	L= 1.0 μ H DCR= 2.6 mOhm	1	\$1.19	 XAL7070 87 mm ²
23.	M1	Texas Instruments	CSD16340Q3	VdsMax= 25.0 V IdsMax= 60.0 Amps	1	\$0.37	 DQG0008A 18 mm ²
24.	M2	Texas Instruments	CSD16327Q3	VdsMax= 25.0 V IdsMax= 22.0 Amps	1	\$0.36	 DQG0008A 18 mm ²
25.	M3	Texas Instruments	CSD17575Q3	VdsMax= 30.0 V IdsMax= 60.0 Amps	1	\$0.35	 DQG0008A 18 mm ²
26.	M4	Texas Instruments	CSD17577Q3A	VdsMax= 30.0 V IdsMax= 35.0 Amps	1	\$0.21	 DNH0008A 18 mm ²
27.	Rcomp	Vishay-Dale	CRCW04026K49FKED Series= CRCW..e3	Res= 6.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
28.	Rcsg	Vishay-Dale	CRCW0603100RFKEA Series= CRCW..e3	Res= 100.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
29.	Rcsp	Vishay-Dale	CRCW0603100RFKEA Series= CRCW..e3	Res= 100.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
30.	Rf	Vishay-Dale	CRCW060310R0FKEA Series= CRCW..e3	Res= 10.0 Ohm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
31.	Rfbb	Yageo America	RC0603FR-0720KL Series= ?	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
32.	Rfbt	Yageo America	RC0603FR-07280KL Series= ?	Res= 280.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
33.	Rmode	Vishay-Dale	CRCW060393K1FKEA Series= CRCW..e3	Res= 93.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
34.	Rpg	Yageo America	RC0603FR-0720KL Series= ?	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
35.	Rsense	CUSTOM	CUSTOM Series= ?	Res= 3.6 mOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm ²
36.	Rt	Vishay-Dale	CRCW040273K2FKED Series= CRCW..e3	Res= 73.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
37.	Ruvb	Vishay-Dale	CRCW040236K5FKED Series= CRCW..e3	Res= 36.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
38.	Rvvt	Yageo America	RC0402FR-07249KL Series= ?	Res= 249.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
39.	U1	Texas Instruments	LM5175PWPR	Switcher	1	\$3.10	 PWP0028F_N 98 mm ²

Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cout	IC	Initial Condition	12.0 V
2.	Coutx	IC	Initial Condition	12.0 V
3.	Coutx2	IC	Initial Condition	12.0 V
4.	Coutx3	IC	Initial Condition	12.0 V
5.	Cslope	IC	Initial Condition	0 V
6.	Css	IC	Initial Voltage	1.195 V
7.	L1	IC	Initial Current	-16.134453781512608 A
8.	Rload	R	Load Resistance	1.0 Ohm



Design Inputs

#	Name	Value	Description
1.	Iout	12.0 A	Maximum Output Current
2.	VinMax	12.0 V	Maximum input voltage
3.	VinMin	10.0 V	Minimum input voltage
4.	Vout	12.0 V	Output Voltage
5.	base_pn	LM5175	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0 degC	Ambient temperature

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	0.0 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	0.0 A	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	0.0 A	Current	Output capacitor_x RMS ripple current
4.	Iin Avg	12.173 A	Current	Average input current
5.	L Ipp	0.0 A	Current	Peak-to-peak inductor ripple current
6.	L1 Irms	12.0 A	Current	Inductor ripple current
7.	M1 Irms	12.0 A	Current	MOSFET RMS ripple current
8.	M2 Irms	0.0 A	Current	MOSFET RMS ripple current
9.	SW Ipk	0.0 A	Current	Peak switch current
10.	BOM Count	4	General	Total Design BOM count
11.	FootPrint	817.0 mm ²	General	Total Foot Print Area of BOM components
12.	Frequency	343.832 kHz	General	Switching frequency
13.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
14.	M1 Rdson	4.3 mOhm	General	Drain-Source On-resistance
15.	M1 ThetaJA	42.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
16.	M2 Rdson	4.8 mOhm	General	Drain-Source On-resistance
17.	M2 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
18.	Mode	CCM	General	Conduction Mode
19.	Pout	144.0 W	General	Total output power
20.	Total BOM	\$0.0	General	Total BOM Cost
21.	Cross Freq	16.353 kHz	Op Point	Bode plot crossover frequency
22.	Duty Cycle	100.0 %	Op Point	Duty cycle
23.	Efficiency	98.581 %	Op Point	Steady state efficiency
24.	Gain Marg	-17.209 dB	Op Point	Bode Plot Gain Margin
25.	IC Tj	33.016 degC	Op Point	IC junction temperature
26.	ICThetaJA	30.5 degC/W	Op Point	IC junction-to-ambient thermal resistance
27.	IOUT_OP	12.0 A	Op Point	Iout operating point
28.	Low Freq Gain	67.14 dB	Op Point	Gain at 1Hz
29.	M1 TjOP	66.162 degC	Op Point	MOSFET junction temperature
30.	M2 TjOP	32.162 degC	Op Point	MOSFET junction temperature
31.	Operating Topology	Buck	Op Point	The current operating topology of the device
32.	Phase Marg	60.613 deg	Op Point	Bode Plot Phase Margin
33.	VIN_OP	12.0 V	Op Point	Vin operating point
34.	Vout Actual	12.0 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
35.	Vout OP	12.0 V	Op Point	Operational Output Voltage
36.	Vout Tolerance	1.886 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
37.	Vout p-p	0.0 V	Op Point	Peak-to-peak output ripple voltage
38.	Cin Pd	0.0 W	Power	Input capacitor power dissipation
39.	Cout Pd	0.0 W	Power	Output capacitor power dissipation
40.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
41.	D2 Pd	0.0 W	Power	Diode power dissipation
42.	D3 Pd	0.0 W	Power	Diode power dissipation
43.	IC Pd	98.88 mW	Power	IC power dissipation
44.	L Pd	468.0 mW	Power	Inductor power dissipation
45.	M1 Pd	848.065 mW	Power	MOSFET power dissipation
46.	M1 PdCond	671.515 mW	Power	M1 MOSFET conduction losses
47.	M1 PdSw	176.551 mW	Power	M1 MOSFET switching losses
48.	M2 Pd	39.3 mW	Power	MOSFET power dissipation
49.	M2 PdCond	0.0 W	Power	M2 MOSFET conduction losses
50.	M2 PdSw	39.3 mW	Power	M2 MOSFET switching losses
51.	M3 Pd	619.2 mW	Power	M3 MOSFET total power dissipation
52.	M3 PdCond	619.2 mW	Power	M3 MOSFET conduction losses
53.	M4 Pd	0.0 W	Power	M4 MOSFET total power dissipation
54.	Rsense Pd	0.0 W	Power	LED Current Rns Power Dissipation
55.	Total Pd	2.073 W	Power	Total Power Dissipation

Design Assistance

1. Tip: Snubbers and/or gate resistors may be required to limit the SW1,2 node switching spikes below the IC and FET abs max ratings.
2. Tip: Slope Capacitor: smaller slope capacitors provide better transition region behavior.
3. **LM5175** Product Folder : <http://www.ti.com/product/LM5175> : contains the data sheet and other resources.

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