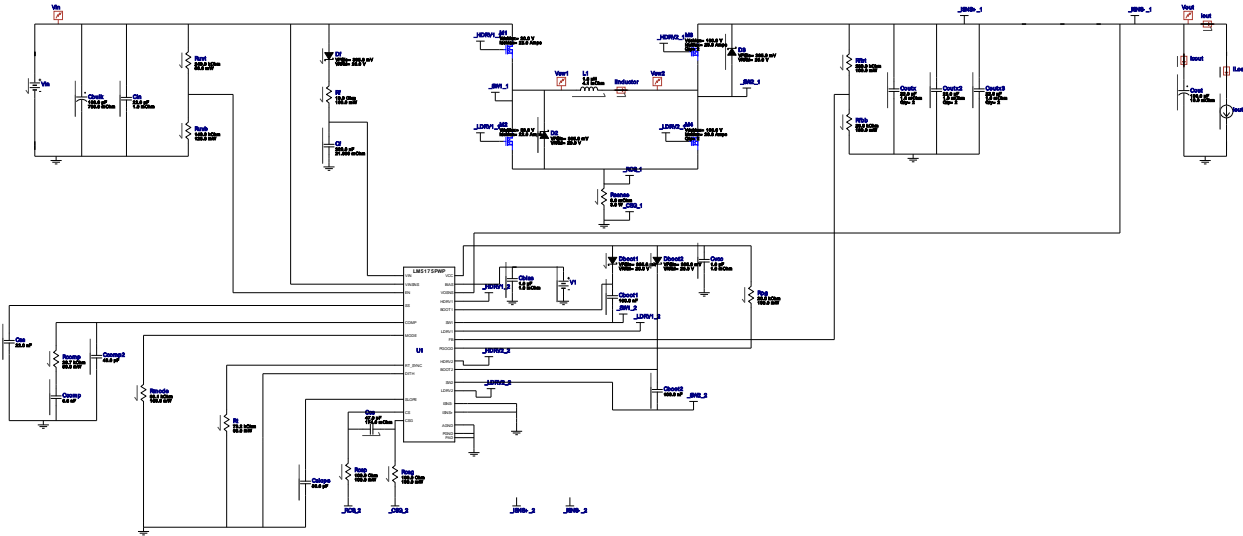



















WEBENCH® Electrical Simulation Report

Electrical BOM

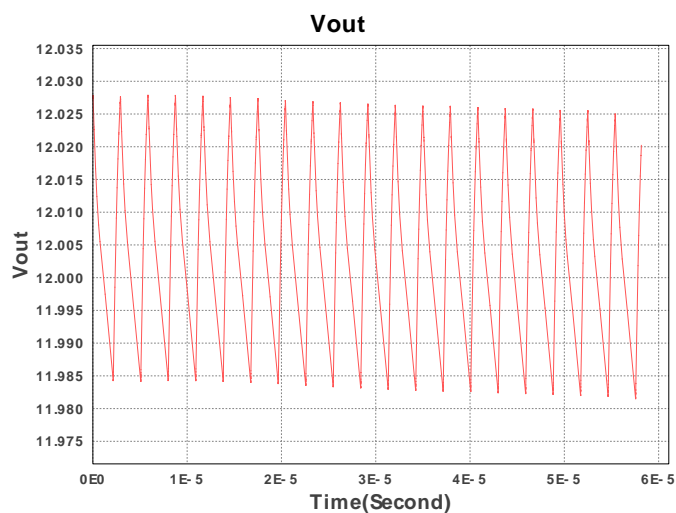
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Taiyo Yuden	TMK212BJ105KG-T Series= X5R	Cap= 1.0 μ F ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cboot1	AVX	08053C104JAZ2A Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.10	0805 7 mm ²
3.	Cboot2	AVX	08053C104JAZ2A Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.10	0805 7 mm ²
4.	Cbulk	Panasonic	EEE-FK0J101UR Series= FK	Cap= 100.0 μ F ESR= 700.0 mOhm VDC= 6.3 V IRMS= 160.0 mA	1	\$0.09	 SM_RADIAL_C 62 mm ²
5.	Ccomp	Samsung Electro-Mechanics	CL21C682JBFNNNE Series= C0G/NP0	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.05	0805 7 mm ²
6.	Ccomp2	Samsung Electro-Mechanics	CL21C430JBANNNC Series= C0G/NP0	Cap= 43.0 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	CGA3E3X7R1H224K080AB Series= X7R	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	GRM21BD70J226ME44L Series= X7T	Cap= 22.0 μ F ESR= 1.0 mOhm VDC= 6.3 V IRMS= 6.0 A	1	\$0.11	0805 7 mm ²
10.	Cout	Panasonic	25SVPF180M Series= SVPF	Cap= 180.0 μ F ESR= 16.0 mOhm VDC= 25.0 V IRMS= 4.65 A	1	\$0.63	 CAPSMT_62_E12 106 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	\$0.31	 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	\$0.31	 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	\$0.31	 1210 15 mm ²
14.	Cslope	Samsung Electro-Mechanics	CL10C560JB8NNNC Series= C0G/NP0	Cap= 56.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
15.	Css	TDK	CGA4J2C0G1H223J125AA Series= C0G/NP0	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.09	 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	\$0.02	 0603 5 mm ²
17.	D2	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
18.	D3	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
19.	Dboot1	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
20.	Dboot2	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
21.	Df	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.08	 SOD-123F 12 mm ²
22.	L1	Coilcraft	XAL7070-182MEB	L= 1.8 μ H DCR= 4.1 mOhm	1	\$1.19	 XAL7070 87 mm ²
23.	M1	Texas Instruments	CSD17571Q2	VdsMax= 30.0 V IdsMax= 22.0 Amps	1	\$0.13	DQK0006C 9 mm ²
24.	M2	Texas Instruments	CSD17571Q2	VdsMax= 30.0 V IdsMax= 22.0 Amps	1	\$0.13	DQK0006C 9 mm ²
25.	M3	Texas Instruments	CSD19538Q2	VdsMax= 100.0 V IdsMax= 28.8 Amps	2	\$0.21	DQK0006C 9 mm ²
26.	M4	Texas Instruments	CSD19538Q2	VdsMax= 100.0 V IdsMax= 28.8 Amps	2	\$0.21	DQK0006C 9 mm ²
27.	Rcomp	Yageo	RC0201FR-0723K7L Series= ?	Res= 23.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 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
31.	Rfbb	Vishay-Dale	CRCW060320K0FKEA Series= CRCW..e3	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
32.	Rfbt	Yageo	RC0603FR-07280KL Series= ?	Res= 280.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
33.	Rmode	Yageo	RC0603FR-0793K1L Series= ?	Res= 93.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
34.	Rpg	Vishay-Dale	CRCW060320K0FKEA Series= CRCW..e3	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
35.	Rsense	Vishay-Dale	WSR38L000FEA Series= WSR	Res= 8.0 mOhm Power= 3.0 W Tolerance= 1.0%	1	\$0.67	4527 122 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	Panasonic	ERJ-6ENF1433V Series= ERJ-6E	Res= 143.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
38.	Rvut	Yageo	RC0201FR-07249KL Series= ?	Res= 249.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	0201 2 mm ²
39.	U1	Texas Instruments	LM5175PWPR	Switcher	1	\$3.10	PWP0028F_N 98 mm ²

Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cout2	IC	no description	12.0 V
2.	V1	V	Bias Voltage	9 V
3.	Cout3	IC	no description	12.0 V
4.	Css	IC	Initial Voltage	1.195 V
5.	Cout	IC	no description	12.0 V
6.	Coutx	IC	Initial Condition	12.0
7.	L1	IC	Initial Current	-10.588235294117647 A
8.	Iout	I	Load Current	3.0 A



Design Inputs

#	Name	Value	Description
1.	Iout	3.0 A	Maximum Output Current
2.	VinMax	4.3 V	Maximum input voltage
3.	VinMin	3.7 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	1.357 A	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	1.84 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	2.331 A	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	86.901 mW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	1.866 A	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	1.741 mW	Capacitor	Output capacitor_x power loss
7.	D2 Pd	0.0 W	Diode	Diode power dissipation
8.	D3 Pd	0.0 W	Diode	Diode power dissipation
9.	IC Pd	203.48 mW	IC	IC power dissipation
10.	IC Tj	36.206 degC	IC	IC junction temperature
11.	IC Tolerance	0.0 V	IC	IC Feedback Tolerance
12.	ICThetaJA	30.5 degC/W	IC	IC junction-to-ambient thermal resistance
13.	Iin Avg	11.576 A	IC	Average input current
14.	L Ipp	4.699 A	Inductor	Peak-to-peak inductor ripple current
15.	L Pd	503.91 mW	Inductor	Inductor power dissipation
16.	L1 Irms	11.086 A	Inductor	Inductor ripple current
17.	M1 Pd	3.564 W	Mosfet	M1 MOSFET total power dissipation
18.	M1 PdCond	3.564 W	Mosfet	M1 MOSFET conduction losses
19.	M2 Pd	0.0 W	Mosfet	M2 MOSFET total power dissipation
20.	M3 Irms	8.601 A	Mosfet	MOSFET RMS ripple current
21.	M3 Pd	1.292 W	Mosfet	MOSFET power dissipation
22.	M3 PdCond	1.222 W	Mosfet	M1 MOSFET conduction losses
23.	M3 PdSw	69.692 mW	Mosfet	M1 MOSFET switching losses
24.	M3 ThetaJA	32.5 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
25.	M3 TjOP	80.881 degC	Mosfet	MOSFET junction temperature
26.	M4 Irms	3.62 A	Mosfet	MOSFET RMS ripple current
27.	M4 Pd	584.43 mW	Mosfet	MOSFET power dissipation
28.	M4 PdCond	216.44 mW	Mosfet	M2 MOSFET conduction losses
29.	M4 PdSw	0.0 W	Mosfet	M2 MOSFET switching losses
30.	M4 ThetaJA	32.5 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
31.	M4 TjOP	124.486 degC	Mosfet	MOSFET junction temperature
32.	M4 TjOP	124.49 degC	Mosfet	M4 MOSFET junction temperature
33.	Cin Pd	1.84 mW	Power	Input capacitor power dissipation
34.	Cout Pd	86.901 mW	Power	Output capacitor power dissipation
35.	Coutx Pd	1.741 mW	Power	Output capacitor_x power loss
36.	D2 Pd	0.0 W	Power	Diode power dissipation
37.	D3 Pd	0.0 W	Power	Diode power dissipation
38.	IC Pd	203.48 mW	Power	IC power dissipation
39.	L Pd	503.91 mW	Power	Inductor power dissipation
40.	M1 Pd	3.564 W	Power	M1 MOSFET total power dissipation
41.	M1 PdCond	3.564 W	Power	M1 MOSFET conduction losses
42.	M2 Pd	0.0 W	Power	M2 MOSFET total power dissipation
43.	M3 Pd	1.292 W	Power	MOSFET power dissipation
44.	M3 PdCond	1.222 W	Power	M1 MOSFET conduction losses
45.	M3 PdSw	69.692 mW	Power	M1 MOSFET switching losses
46.	M3 Rdson	16.52 mOhm	Power	Drain-Source On-resistance
47.	M4 Pd	584.43 mW	Power	MOSFET power dissipation
48.	M4 PdCond	216.44 mW	Power	M2 MOSFET conduction losses
49.	M4 PdSw	0.0 W	Power	M2 MOSFET switching losses
50.	M4 Rdson	16.52 mOhm	Power	Drain-Source On-resistance
51.	Rsense Pd	591.8 mW	Power	LED Current Rsns Power Dissipation
52.	Total Pd	6.83 W	Power	Total Power Dissipation
53.	Rsense Pd	591.8 mW	Resistor	LED Current Rsns Power Dissipation
54.	BOM Count	44	System Information	Total Design BOM count
55.	Cross Freq	8.903 kHz	System Information	Bode plot crossover frequency
56.	Duty Cycle	65.351 %	System Information	Duty cycle
57.	Efficiency	84.053 %	System Information	Steady state efficiency
58.	FootPrint	789.0 mm ²	System Information	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
59.	Frequency	343.832 kHz	System Information	Switching frequency
60.	Gain Marg	-10.75 dB	System Information	Bode Plot Gain Margin
61.	Iout	3.0 A	System Information	Iout operating point
62.	Low Freq Gain	59.995 dB	System Information	Gain at 1Hz
63.	Mode	CCM	System Information	Conduction Mode
64.	Operating Topology	Boost	System Information	The current operating topology of the device
65.	Phase Marg	58.016 deg	System Information	Bode Plot Phase Margin
66.	Pout	36.0 W	System Information	Total output power
67.	SW Ipk	11.008 A	System Information	Peak switch current
68.	Total BOM	\$9.72	System Information	Total BOM Cost
69.	Vin	3.7 V	System Information	Vin operating point
70.	Vout	12.0 V	System Information	Operational Output Voltage
71.	Vout Actual	12.0 V	System Information	Vout Actual calculated based on selected voltage divider resistors
72.	Vout Tolerance	1.886 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
73.	Vout p-p	112.224 mV	System Information	Peak-to-peak output ripple voltage

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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