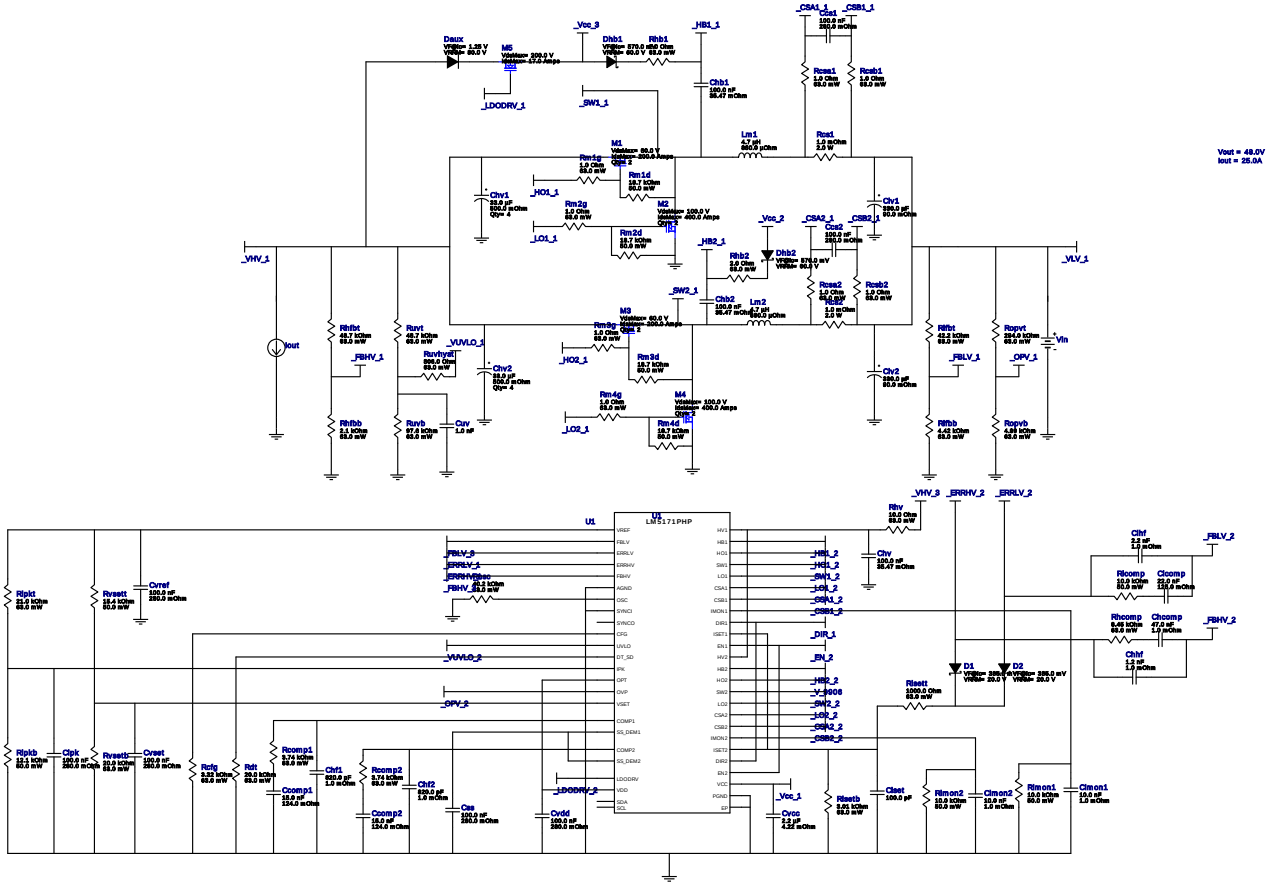
WEBENCH® Design Report

VinMin = 16.0V
VinMax = 26.0V
Vout = 48.0V
Iout = 25.0A

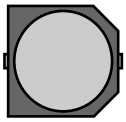
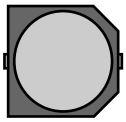
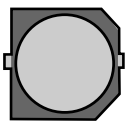
Device = LM5171PHPR
Topology = Boost
Created = 2026-01-21 17:24:58.954
BOM Cost = $35.36
BOM Count = 92
Total Pd = 90.0W

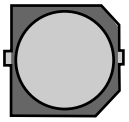
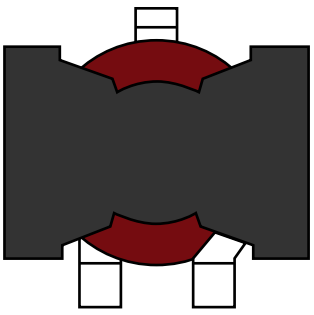
Design : 12 LM5171PHPR
LM5171PHPR 16V-26V to 48.00V @ 25A

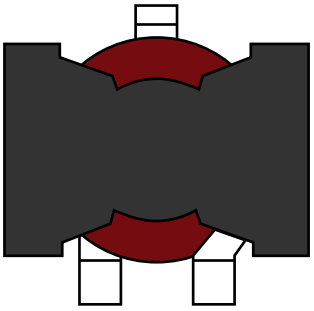
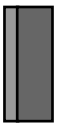


Electrical BOM

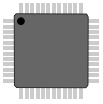
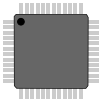
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Ccomp1	Kemet	C0805C153K5RACTU Series= X7R	Cap= 15.0 nF ESR= 124.0 mOhm VDC= 50.0 V IRMS= 555.0 mA	1	$0.01	0805 7 mm²
Ccomp2	Kemet	C0805C153K5RACTU Series= X7R	Cap= 15.0 nF ESR= 124.0 mOhm VDC= 50.0 V IRMS= 555.0 mA	1	$0.01	0805 7 mm²
Ccs1	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
Ccs2	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
Chb1	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 35.47 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²

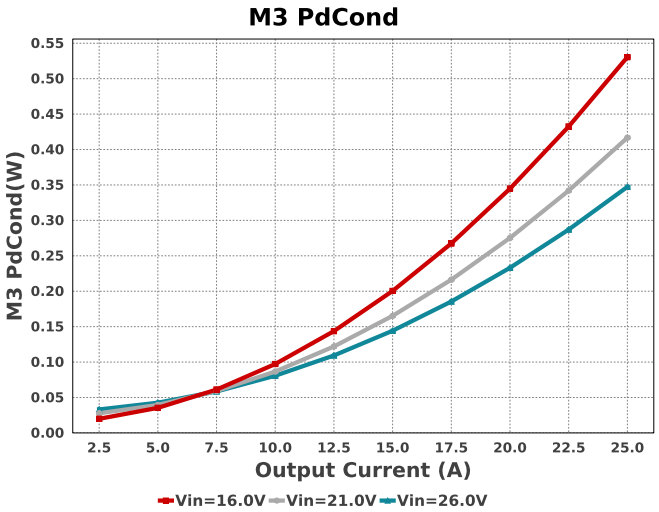
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Chb2	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 35.47 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7 mm^2
Chcomp	MuRata	GRM155R71A473KA01D Series= X7R	Cap= 47.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm^2
Chf1	MuRata	GRM033R71E821KA01D Series= X7R	Cap= 820.0 pF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Chf2	MuRata	GRM033R71E821KA01D Series= X7R	Cap= 820.0 pF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Chhf	MuRata	GRM033R71C122KA01D Series= X7R	Cap= 1.2 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Chv	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 35.47 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7 mm^2
Chv1	Chemi-Con	EMVH630ADA330MJA0G Series= MVH	Cap= 33.0 uF ESR= 500.0 mOhm VDC= 63.0 V IRMS= 100.0 mA	4	$0.40	 CAPSMT_62_JA0 151 mm^2
Chv2	Chemi-Con	EMVH630ADA330MJA0G Series= MVH	Cap= 33.0 uF ESR= 500.0 mOhm VDC= 63.0 V IRMS= 100.0 mA	4	$0.40	 CAPSMT_62_JA0 151 mm^2
Cimon1	MuRata	GRM033R71A103KA01D Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Cimon2	MuRata	GRM033R71A103KA01D Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Cipk	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm^2
Ciset	Kemet	C0201C101K3GACTU Series= C0G/NP0	Cap= 100.0 pF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Clcomp	Kemet	C0805C223K5RACTU Series= X7R	Cap= 22.0 nF ESR= 125.0 mOhm VDC= 50.0 V IRMS= 645.0 mA	1	$0.01	 0805 7 mm^2
Clhf	MuRata	GRM033R71A222KA01D Series= X7R	Cap= 2.2 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	 0201 2 mm^2
Clv1	Nichicon	UUD1V331MNL1GS Series= uD	Cap= 330.0 uF ESR= 90.0 mOhm VDC= 35.0 V IRMS= 670.0 mA	1	$0.33	 SM_RADIAL_10BMM 160 mm^2

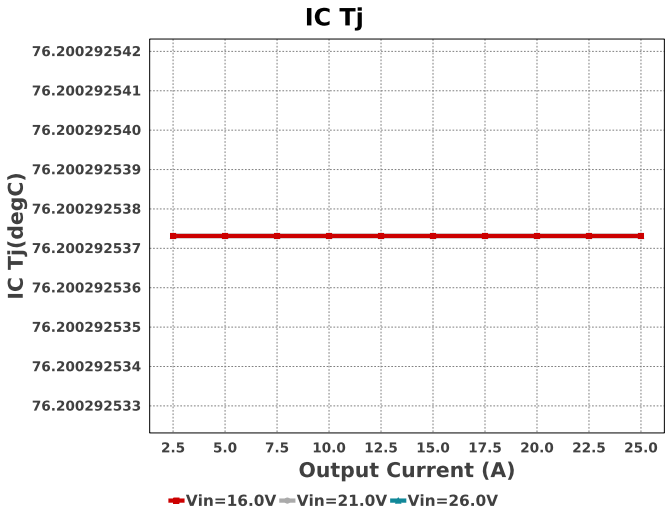
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Clv2	Nichicon	UUD1V331MNL1GS Series= uD	Cap= 330.0 uF ESR= 90.0 mOhm VDC= 35.0 V IRMS= 670.0 mA	1	$0.33	 SM_RADIAL_10BMM 160 mm²
Css	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
Cuv	MuRata	GRM1555C1H102JA01J Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
Cvcc	MuRata	GRM21BR71A225KA01L Series= X7R	Cap= 2.2 uF ESR= 4.22 mOhm VDC= 10.0 V IRMS= 2.08454 A	1	$0.03	 0805 7 mm²
Cvdd	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
Cvref	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
Cvset	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
D1	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.07	 SOD-123F 12 mm²
D2	Comchip Technology	CDBK0520L-HF	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.07	 SOD-123F 12 mm²
Daux	Infineon Technologies	BAS1602VH6327XTSA1	VF@Io= 1.25 V VRRM= 80.0 V	1	$0.06	 SOD-523 5 mm²
Dhb1	Nexperia	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	 SOD-123F 12 mm²
Dhb2	Nexperia	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	 SOD-123F 12 mm²
Lm1	Wurth Elektronik	7443640470B	L= 4.7 µH 880.0 µOhm	1	$6.62	 WE-HCF_2818 656 mm²

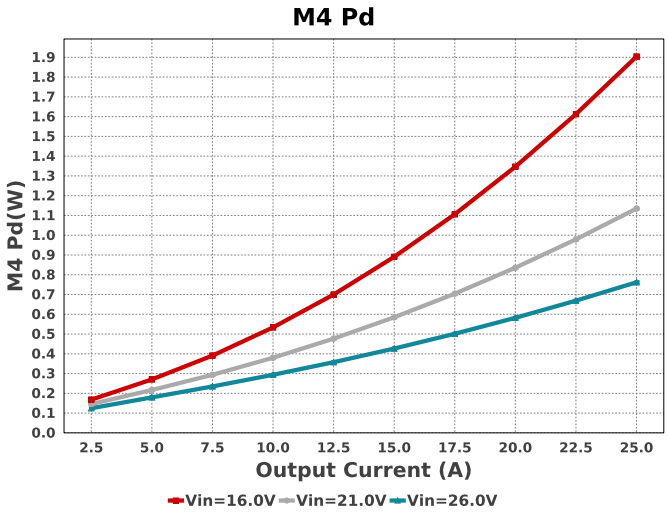
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Lm2	Wurth Elektronik	7443640470B	L= 4.7 µH 880.0 µOhm	1	$6.62	 WE-HCF_2818 656 mm^2
M1	Texas Instruments	CSD18540Q5B	VdsMax= 60.0 V IdsMax= 200.0 Amps	2	$0.75	 DNK0008A 56 mm^2
M2	Texas Instruments	CSD19535KTT	VdsMax= 100.0 V IdsMax= 400.0 Amps	2	$1.12	KTT0002A 198 mm^2
M3	Texas Instruments	CSD18540Q5B	VdsMax= 60.0 V IdsMax= 200.0 Amps	2	$0.75	 DNK0008A 56 mm^2
M4	Texas Instruments	CSD19535KTT	VdsMax= 100.0 V IdsMax= 400.0 Amps	2	$1.12	KTT0002A 198 mm^2
M5	Vishay-Siliconix	IRL640PBF	VdsMax= 200.0 V IdsMax= 17.0 Amps	1	$1.32	 TO-220AB 79 mm^2
Rcfg	Vishay-Dale	CRCW04023K32FKED Series= CRCW..e3	Res= 3.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rcomp1	Vishay-Dale	CRCW04023K74FKED Series= CRCW..e3	Res= 3.74 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rcomp2	Vishay-Dale	CRCW04023K74FKED Series= CRCW..e3	Res= 3.74 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rcs1	Susumu Co Ltd	RL3264SW4-001M-F-T5 Series= RL	Res= 1.0 mOhm Power= 2.0 W Tolerance= 1.0%	1	$0.80	 2512 43 mm^2
Rcs2	Susumu Co Ltd	RL3264SW4-001M-F-T5 Series= RL	Res= 1.0 mOhm Power= 2.0 W Tolerance= 1.0%	1	$0.80	 2512 43 mm^2
Rcsa1	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rcsa2	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rcsb1	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rcsb2	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rdt	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
Rhb1	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2

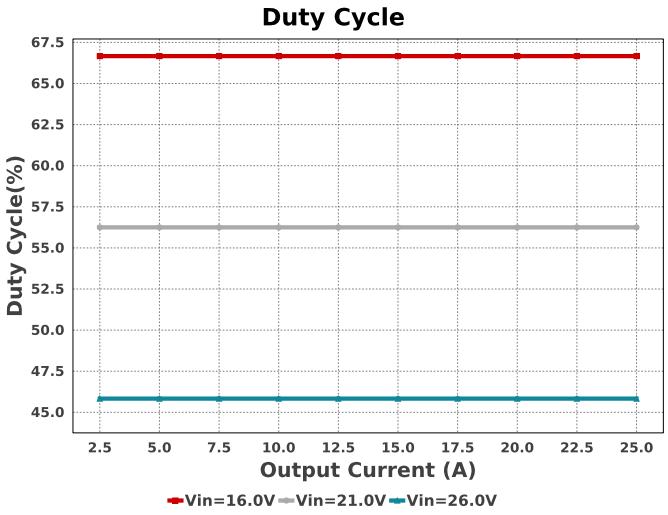
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rhb2	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rhcomp	Vishay-Dale	CRCW04028K45FKED Series= CRCW..e3	Res= 8.45 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rhfbb	Vishay-Dale	CRCW04022K10FKED Series= CRCW..e3	Res= 2.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rhfbt	Vishay-Dale	CRCW040248K7FKED Series= CRCW..e3	Res= 48.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rhv	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rimon1	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rimon2	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Ripkb	Yageo	RC0201FR-0712K1L Series= ?	Res= 12.1 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Ripkt	Vishay-Dale	CRCW040221K0FKED Series= CRCW..e3	Res= 21.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Risetb	Vishay-Dale	CRCW04023K01FKED Series= CRCW..e3	Res= 3.01 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Risett	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rlcomp	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rlfbb	Vishay-Dale	CRCW04024K42FKED Series= CRCW..e3	Res= 4.42 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rlfbt	Vishay-Dale	CRCW040242K2FKED Series= CRCW..e3	Res= 42.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rm1d	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rm1g	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rm2d	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rm2g	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rm3d	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Rm3g	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rm4d	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²

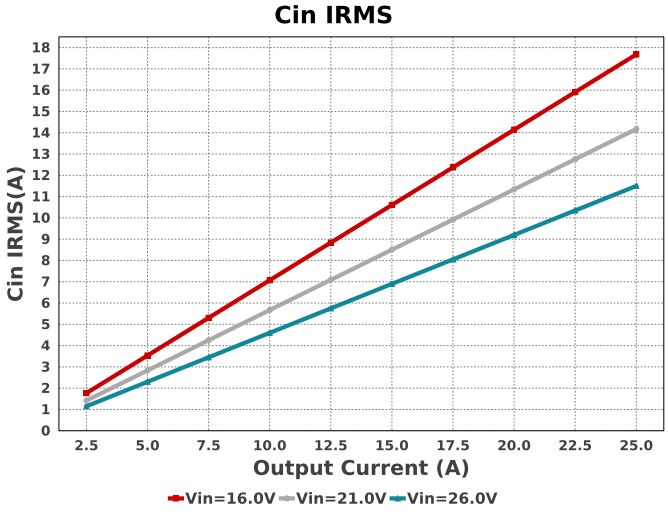
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rm4g	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Ropvb	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Ropvt	Vishay-Dale	CRCW0402294KFKED Series= CRCW..e3	Res= 294.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rosc	Vishay-Dale	CRCW040240K2FKED Series= CRCW..e3	Res= 40.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Ruvb	Vishay-Dale	CRCW040297K6FKED Series= CRCW..e3	Res= 97.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Ruvhyst	Vishay-Dale	CRCW0402806RFKED Series= CRCW..e3	Res= 806.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Ruvt	Vishay-Dale	CRCW040248K7FKED Series= CRCW..e3	Res= 48.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rvsetb	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rvsett	Yageo	RC0201FR-0715K4L Series= ?	Res= 15.4 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
U1	Texas Instruments	LM5171	Switcher	1	$4.01	 PHP0048E 121 mm²
U1	Texas Instruments	LM5171	Switcher	1	$4.01	 PHP0048E 121 mm²

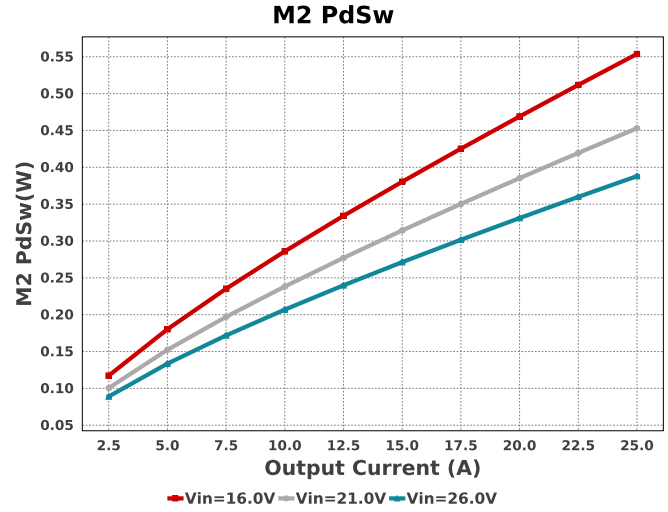


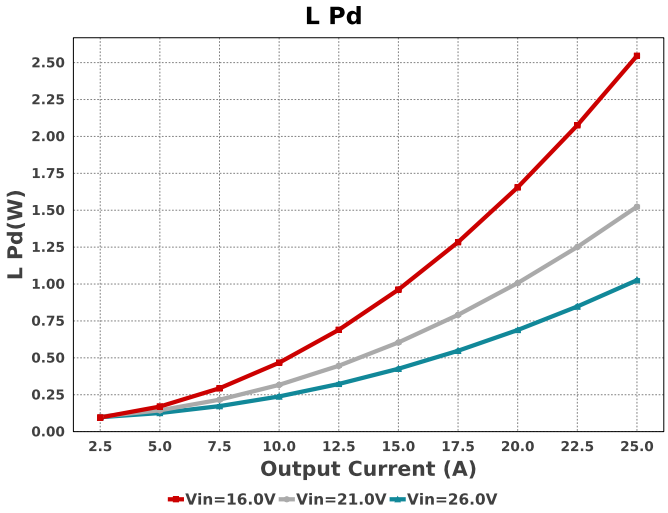


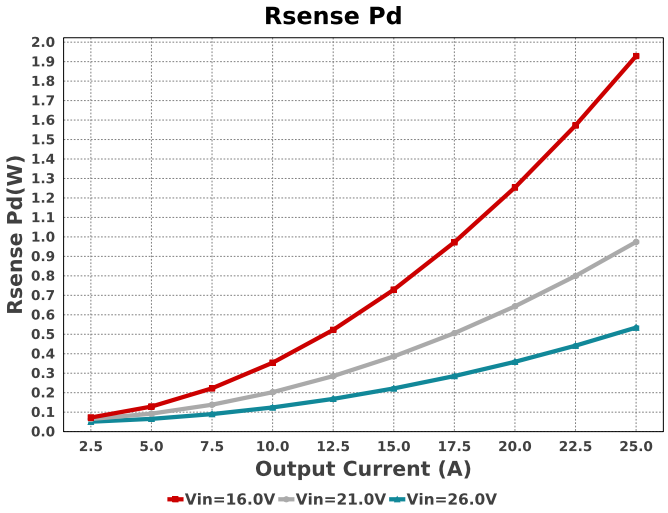


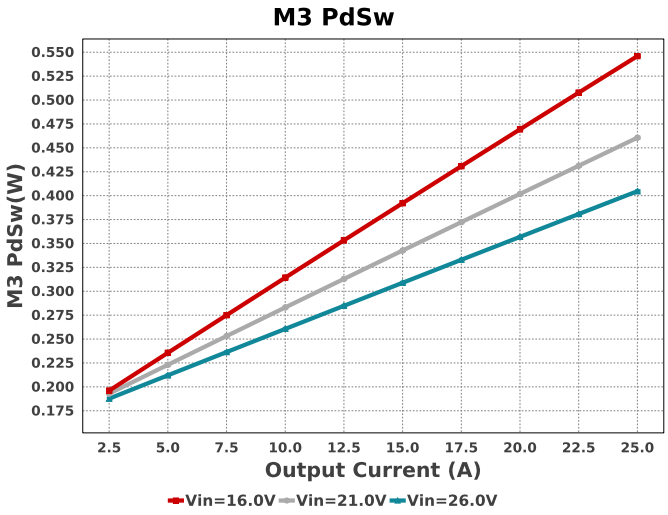


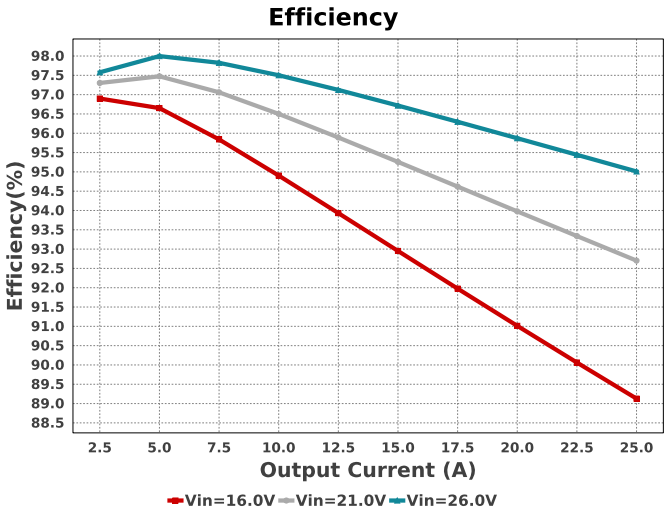


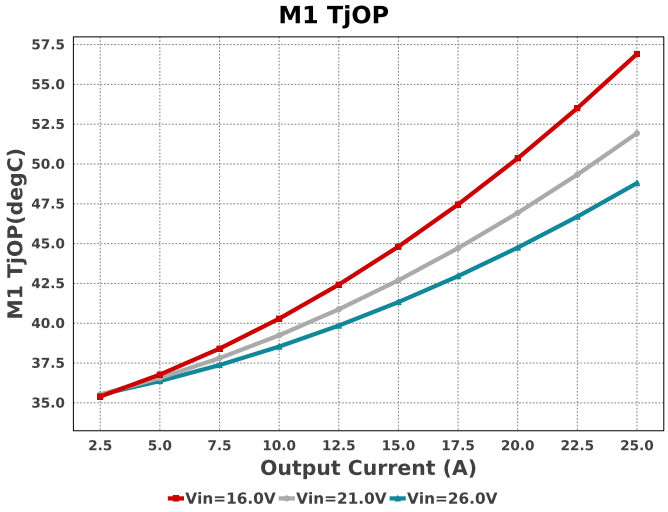


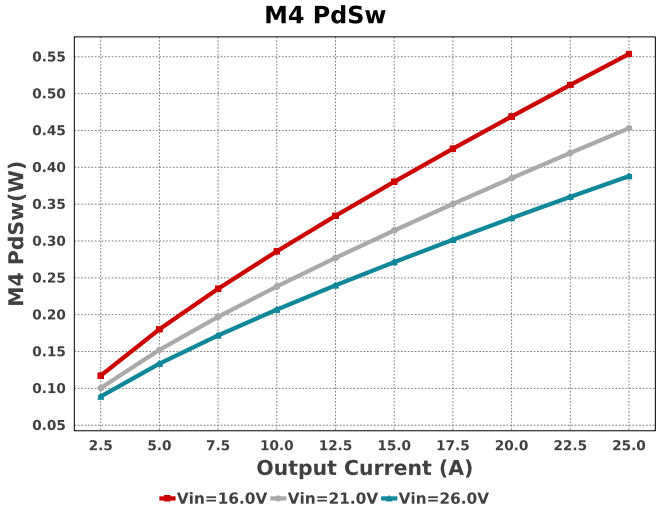


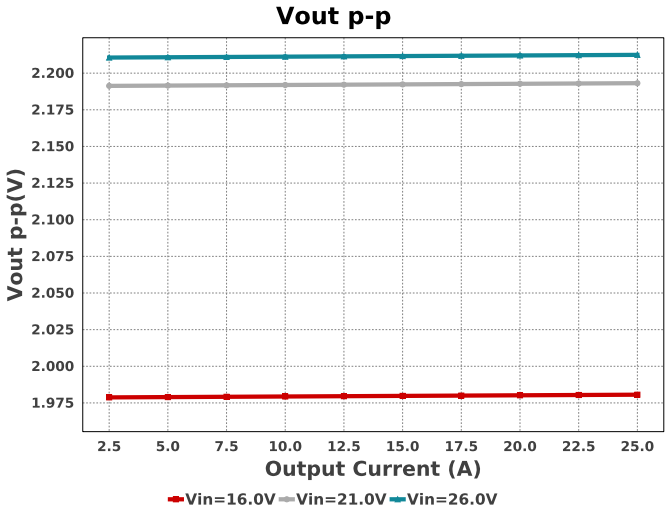


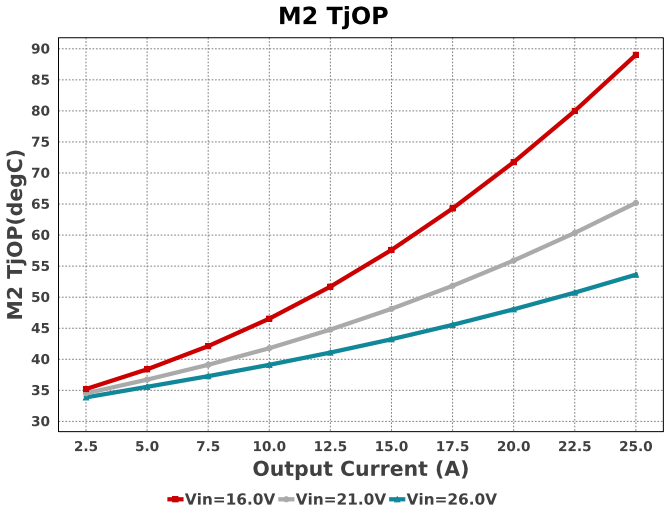


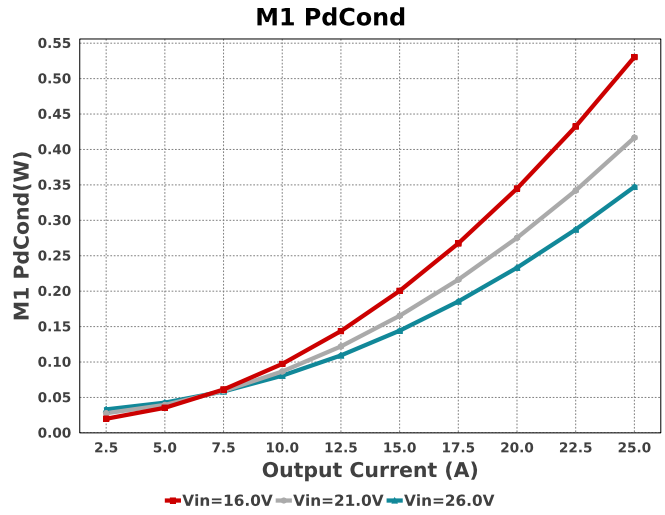


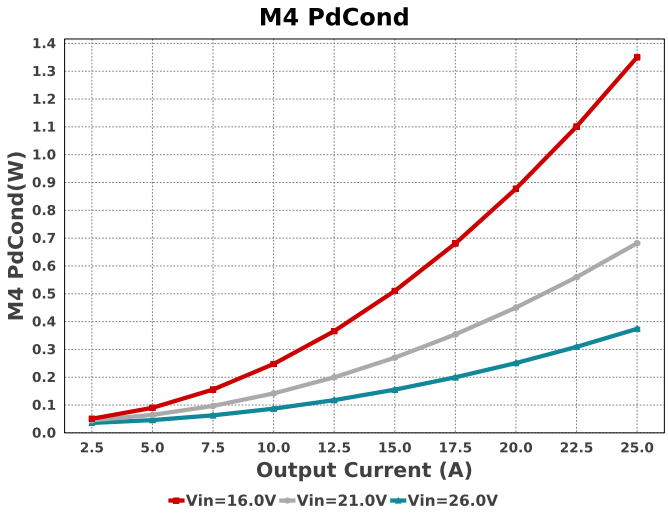


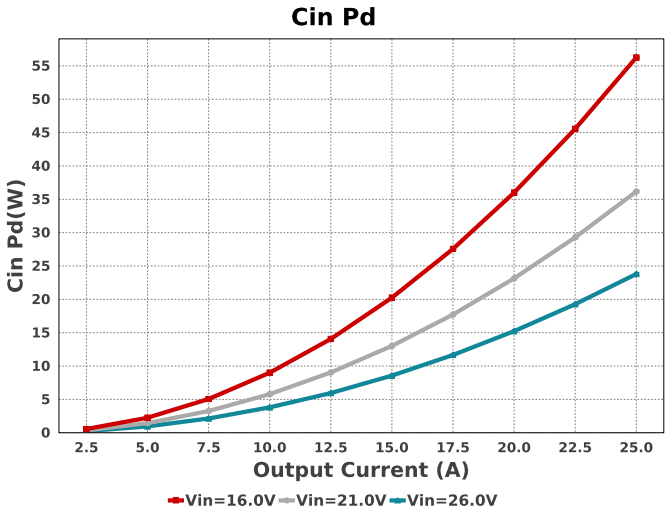


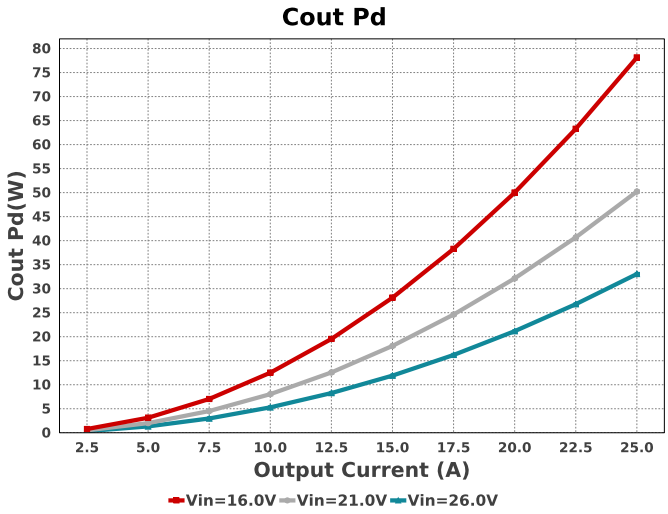


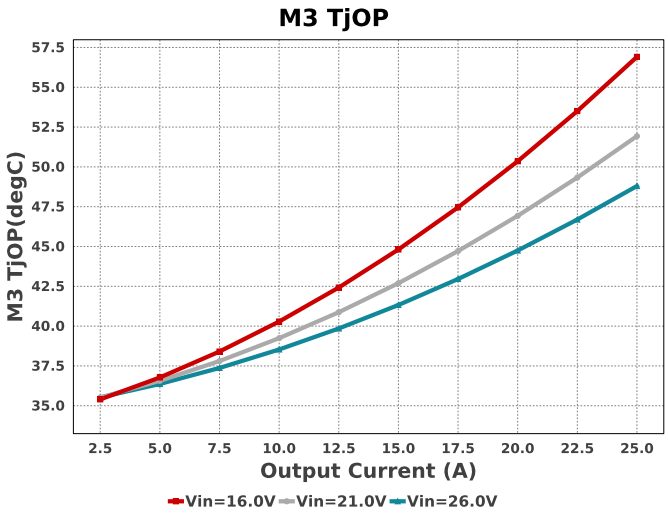


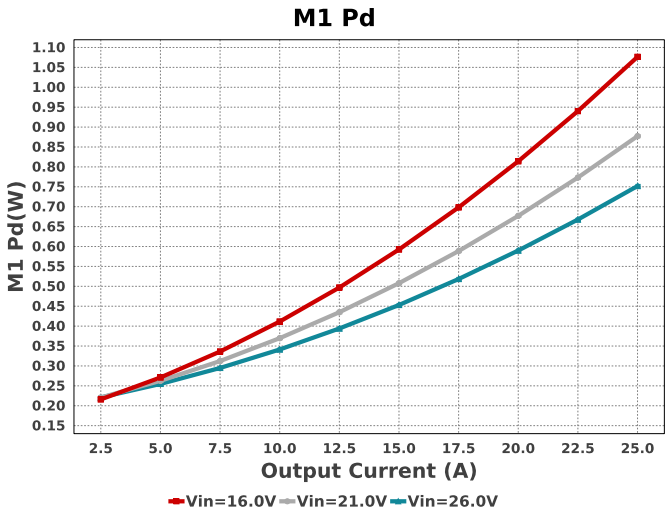


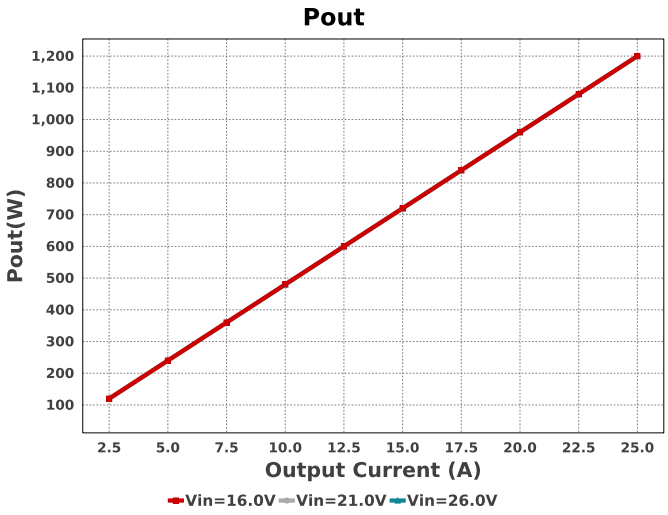


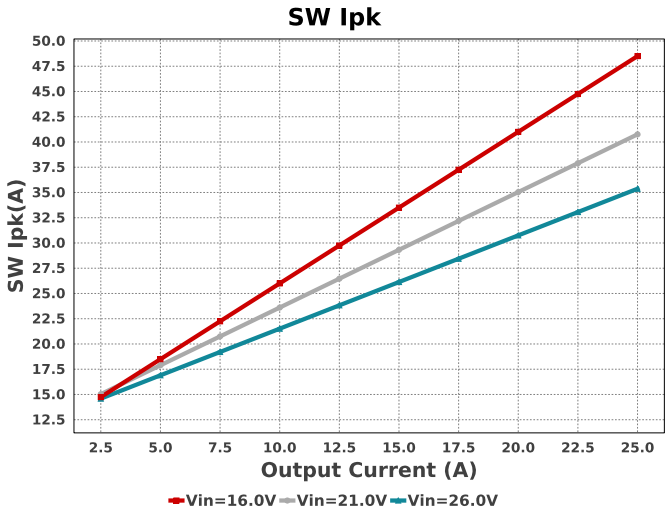


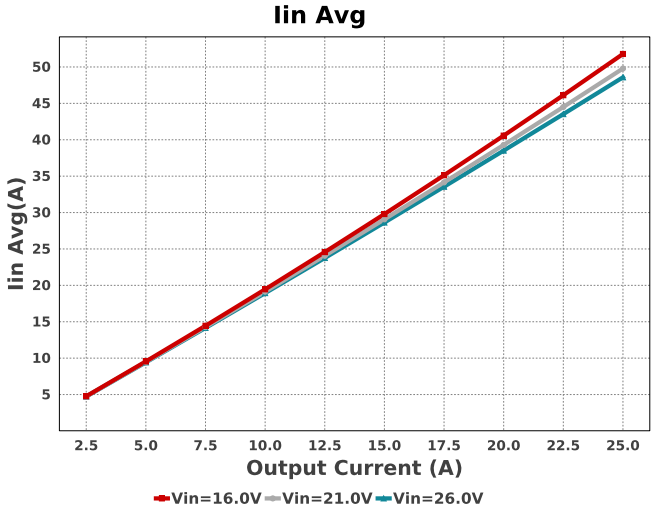


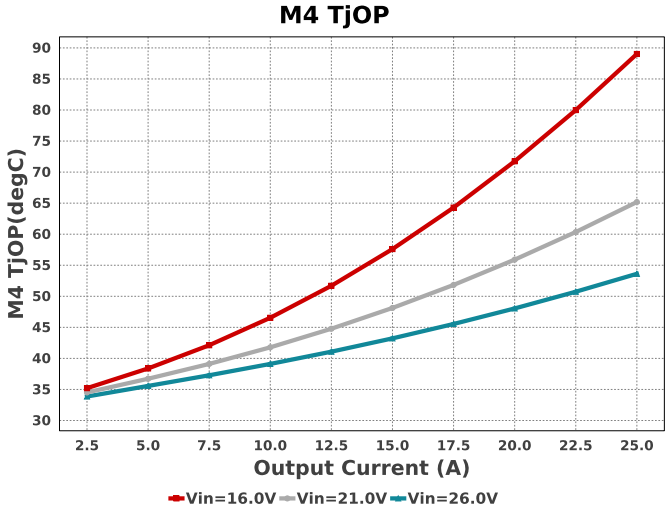


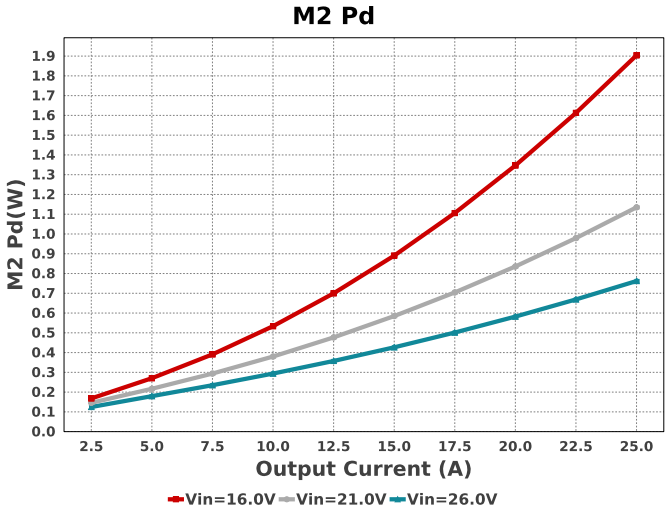


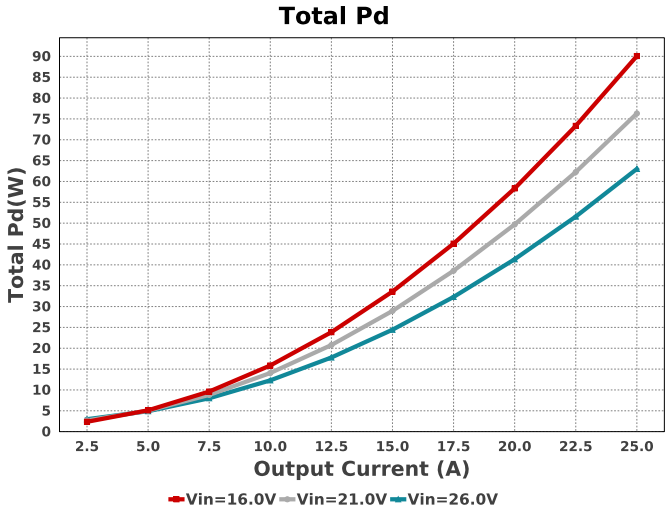


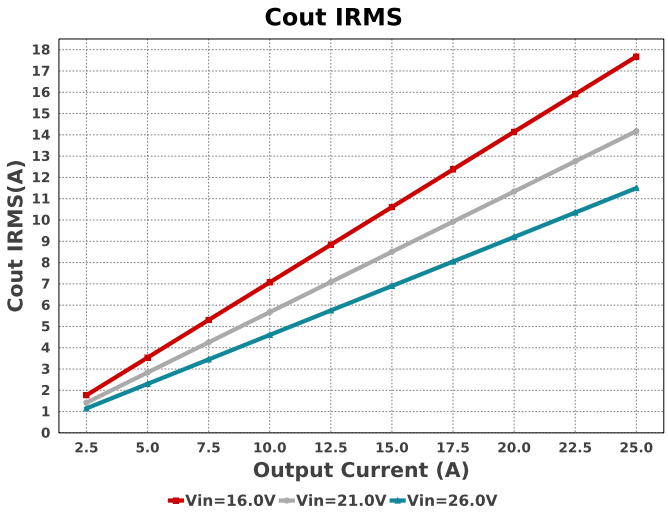


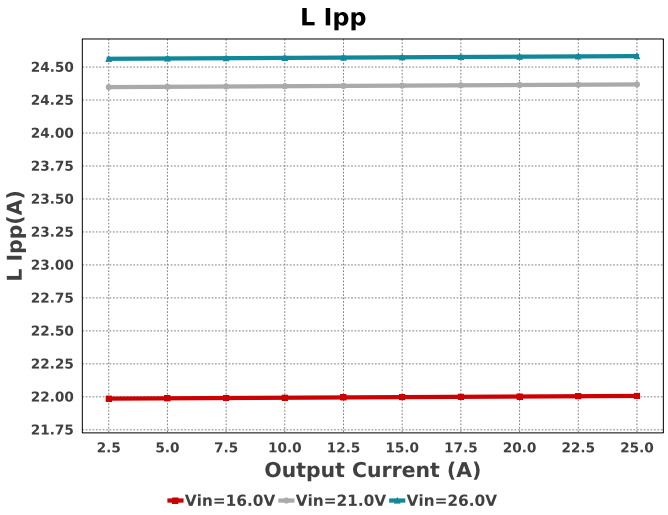


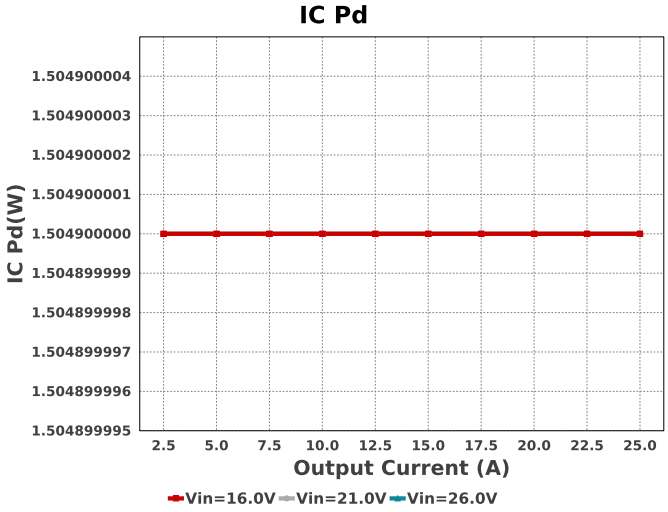


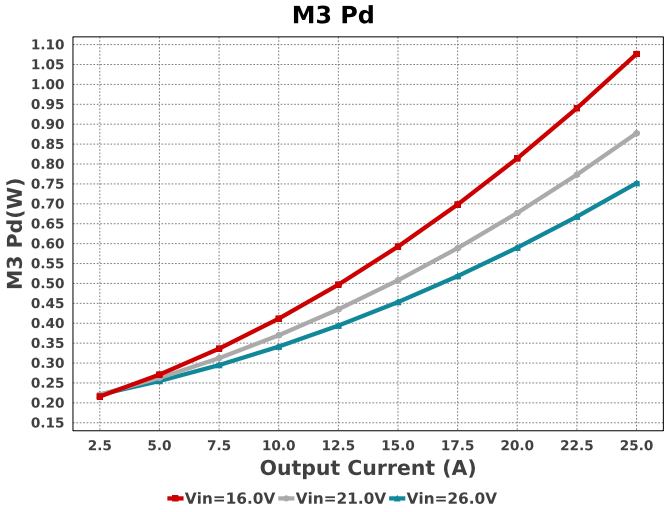


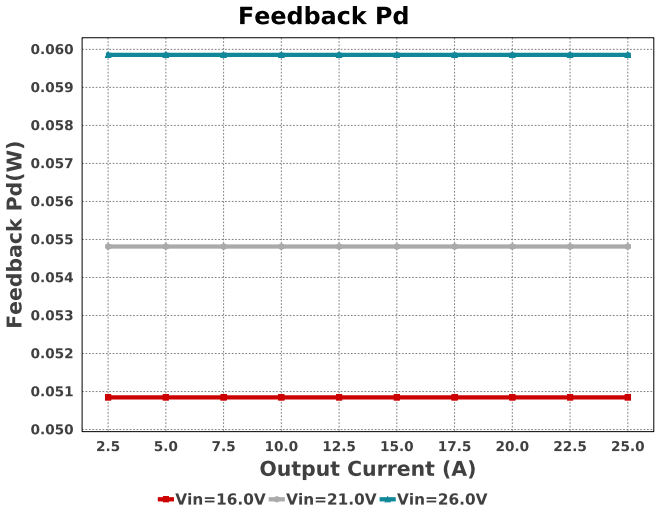


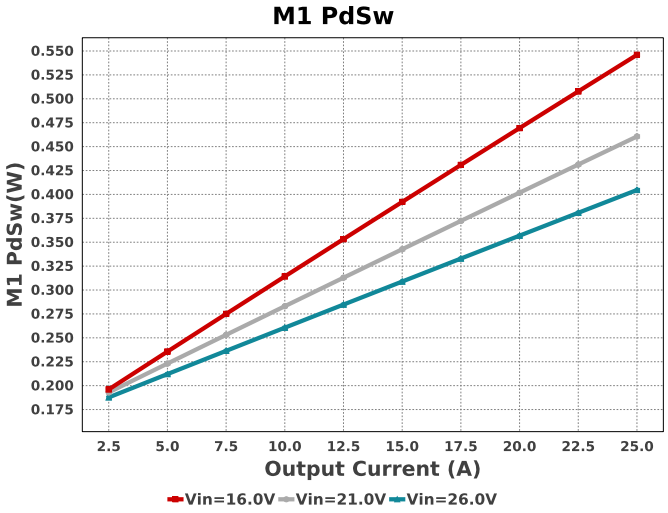


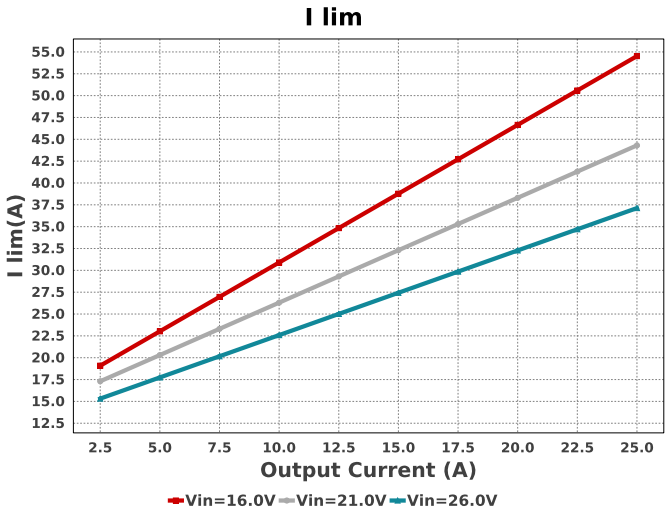


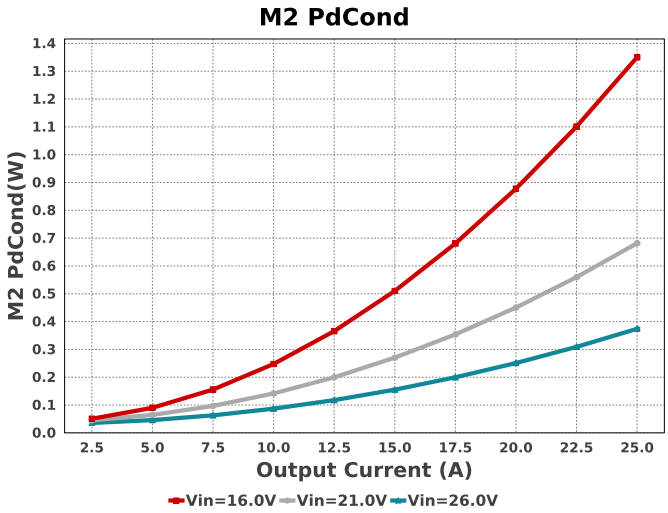












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	17.678 A	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	56.25 W	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	17.678 A	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	78.125 W	Capacitor	Output capacitor power dissipation
5.	I lim	53.375 A	Current	Current limit threshold
6.	IC Pd	1.505 W	IC	IC power dissipation
7.	IC Tj	76.2 degC	IC	IC junction temperature
8.	IC Tolerance	10.0 mV	IC	IC Feedback Tolerance
9.	ICThetaJA	30.7 degC/W	IC	IC junction-to-ambient thermal resistance
10.	Iin Avg	51.779 A	IC	Average input current
11.	L Ipp	22.007 A	Inductor	Peak-to-peak inductor ripple current
12.	L Pd	2.546 W	Inductor	Inductor power dissipation
13.	M1 Pd	1.076 W	Mosfet	M1 MOSFET total power dissipation
14.	M1 PdCond	530.42 mW	Mosfet	M1 MOSFET conduction losses
15.	M1 PdSw	545.95 mW	Mosfet	M1 MOSFET switching losses
16.	M1 TjOP	56.909 degC	Mosfet	M1 MOSFET junction temperature
17.	M2 Pd	1.844 W	Mosfet	M2 MOSFET total power dissipation
18.	M2 PdCond	1.35 W	Mosfet	M2 MOSFET conduction losses
19.	M2 PdSw	494.25 mW	Mosfet	M2 MOSFET switching losses
20.	M2 TjOP	87.177 degC	Mosfet	M2 MOSFET junction temperature
21.	M3 Pd	1.076 W	Mosfet	M3 MOSFET total power dissipation
22.	M3 PdCond	530.42 mW	Mosfet	M3 MOSFET conduction losses
23.	M3 PdSw	545.95 mW	Mosfet	M3 MOSFET switching losses
24.	M3 TjOP	56.909 degC	Mosfet	M3 MOSFET junction temperature
25.	M4 Pd	1.844 W	Mosfet	M4 MOSFET total power dissipation
26.	M4 PdCond	1.35 W	Mosfet	M4 MOSFET conduction losses
27.	M4 PdSw	494.25 mW	Mosfet	M4 MOSFET switching losses
28.	M4 TjOP	87.177 degC	Mosfet	M4 MOSFET junction temperature
29.	Cin Pd	56.25 W	Power	Input capacitor power dissipation
30.	Cout Pd	78.125 W	Power	Output capacitor power dissipation
31.	Feedback Pd	50.846 mW	Power	Power Dissipation in Feedback Resistors
32.	IC Pd	1.505 W	Power	IC power dissipation
33.	L Pd	2.546 W	Power	Inductor power dissipation
34.	M1 Pd	1.076 W	Power	M1 MOSFET total power dissipation
35.	M1 PdCond	530.42 mW	Power	M1 MOSFET conduction losses
36.	M1 PdSw	545.95 mW	Power	M1 MOSFET switching losses
37.	M2 Pd	1.844 W	Power	M2 MOSFET total power dissipation
38.	M2 PdCond	1.35 W	Power	M2 MOSFET conduction losses
39.	M2 PdSw	494.25 mW	Power	M2 MOSFET switching losses
40.	M3 Pd	1.076 W	Power	M3 MOSFET total power dissipation
41.	M3 PdCond	530.42 mW	Power	M3 MOSFET conduction losses
42.	M3 PdSw	545.95 mW	Power	M3 MOSFET switching losses
43.	M4 Pd	1.844 W	Power	M4 MOSFET total power dissipation
44.	M4 PdCond	1.35 W	Power	M4 MOSFET conduction losses
45.	M4 PdSw	494.25 mW	Power	M4 MOSFET switching losses
46.	Rsense Pd	1.929 W	Power	LED Current Rsns Power Dissipation
47.	Total Pd	90.004 W	Power	Total Power Dissipation
48.	Feedback Pd	50.846 mW	Resistor	Power Dissipation in Feedback Resistors
49.	Rsense Pd	1.929 W	Resistor	LED Current Rsns Power Dissipation
50.	BOM Count	92	System Information	Total Design BOM count

#	Name	Value	Category	Description
51.	Duty Cycle	66.667 %	System Information	Duty cycle
52.	Efficiency	89.136 %	System Information	Steady state efficiency
53.	FootPrint	4.542 k mm^2	System Information	Total Foot Print Area of BOM components
54.	Frequency	103.234 kHz	System Information	Switching frequency
55.	Iout	25.0 A	System Information	Iout operating point
56.	Mode	CCM	System Information	Conduction Mode
57.	Pout	1.2 kW	System Information	Total output power
58.	SW Ipk	48.503 A	System Information	Peak switch current
59.	Total BOM	$35.36	System Information	Total BOM Cost
60.	Vin	16.0 V	System Information	Vin operating point
61.	Vout Tolerance	20.833 m%	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
62.	Vout p-p	1.981 V	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	25.0	Maximum Output Current
VinMax	26.0	Maximum input voltage
VinMin	16.0	Minimum input voltage
Vout	48.0	Output Voltage
base_pn	LM5171	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

WEBENCH® Assembly

Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of Cin and Cout, and the inductance and DC resistance of L1 before assembly of the board. Any large discrepancies in values should be electrically simulated in WEBENCH to check for instabilities and thermally simulated in WebTHERM to make sure critical temperatures are not exceeded.

Soldering Component to Board

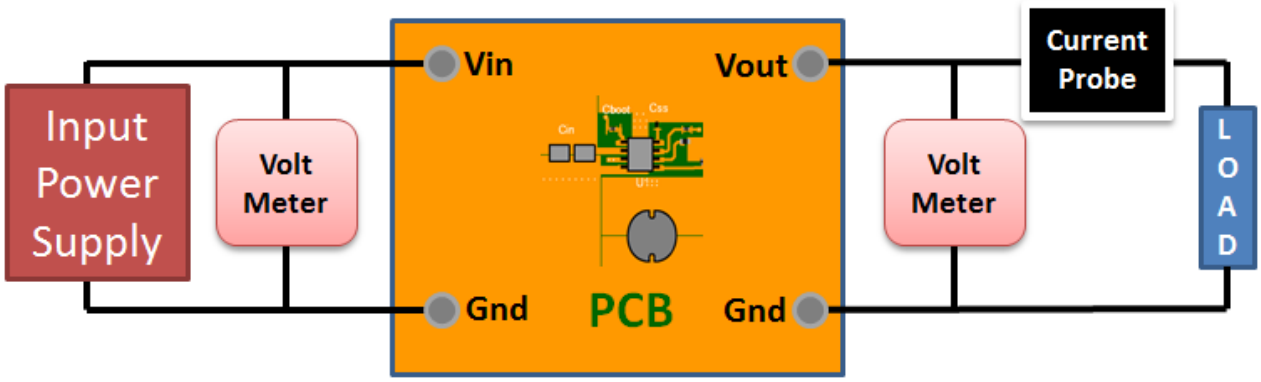
If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab town to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

Initial Startup of Circuit

It is best to initially power up the board by setting the input supply voltage to the lowest operating input voltage 16.0V and set the input supply's current limit to zero. With the input supply off connect up the input supply to Vin and GND. Connect a digital volt meter and a load if needed to set the minimum Iout of the design from Vout and GND. Turn on the input supply and slowly turn up the current limit on the input supply. If the voltage starts to rise on the input supply continue increasing the input supply current limit while watching the output voltage. If the current increases on the input supply, but the voltage remains near zero, then there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the power supply circuit is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

Load Testing

The setup is the same as the initial startup, except that an additional digital voltmeter is connected between Vin and GND, a load is connected between Vout and GND and a current meter is connected in series between Vout and the load. The load must be able to handle at least rated output power + 50% (7.5 watts for this design). Ideally the load is supplied in the form of a variable load test unit. It can also be done in the form of suitably large power resistors. When using an oscilloscope to measure waveforms on the prototype board, the ground leads of the oscilloscope probes should be as short as possible and the area of the loop formed by the ground lead should be kept to a minimum. This will help reduce ground lead inductance and eliminate EMI noise that is not actually present in the circuit.



Design Assistance

1. Master key : 3E1D39EB58A581D0AEF2A44FF11C9AB8[v1]
2. **LM5171** Product Folder : https://www.ti.com/product/LM5171 : contains the data sheet and other resources.