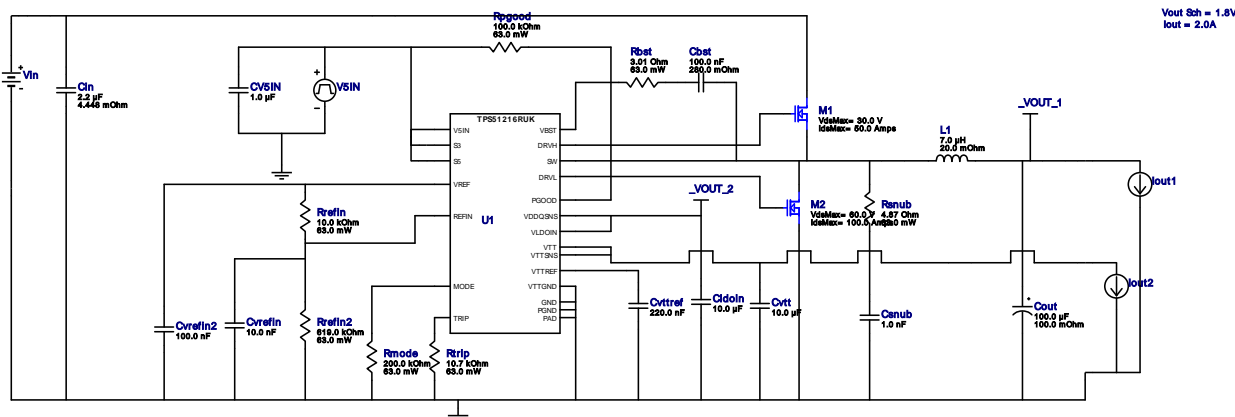


WEBENCH® Design Report

Design : 4466246/37 TPS51216RUKR
TPS51216RUKR 12.0V-22.0V to 1.80V @ 2.0A

VinMin = 12.0V
VinMax = 22.0V
Vout = 1.8V
Vout Sch = 1.8V
Iout = 2.0A

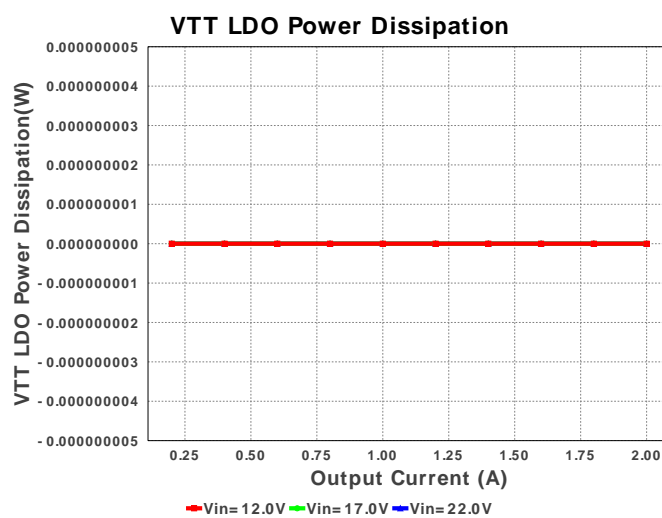
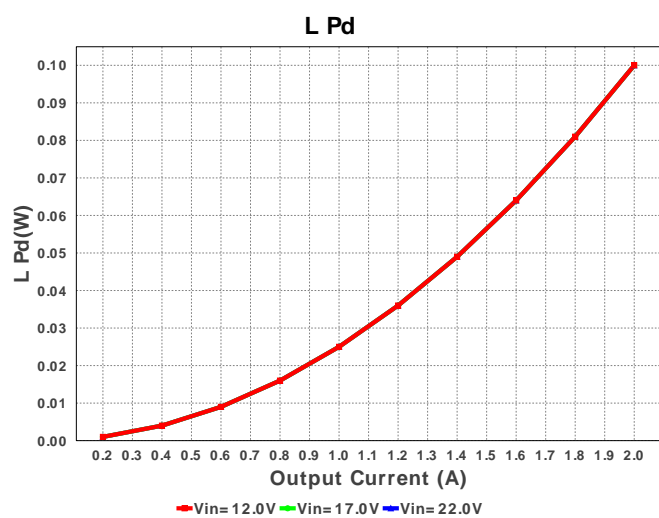
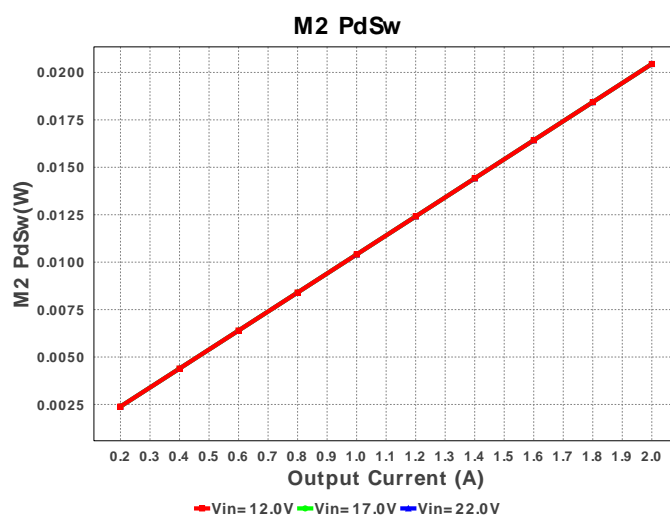
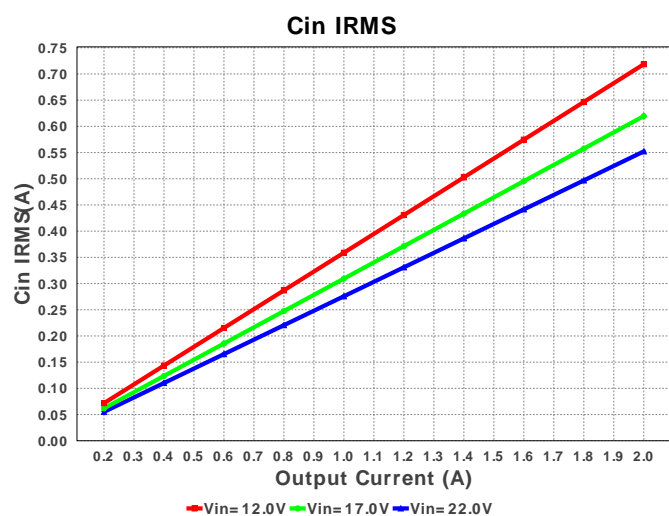
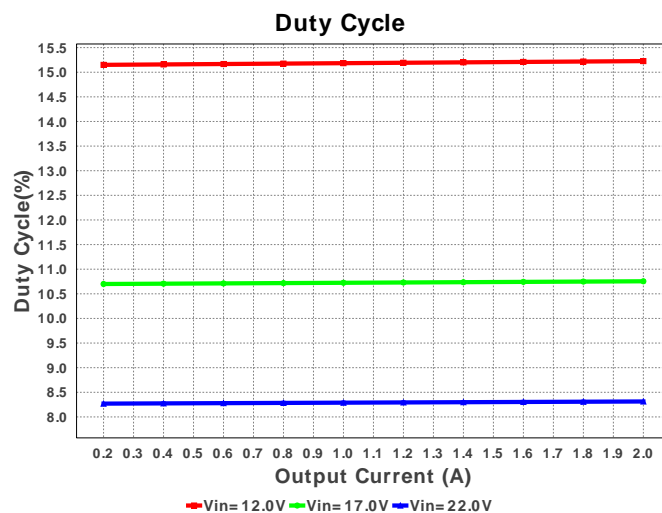
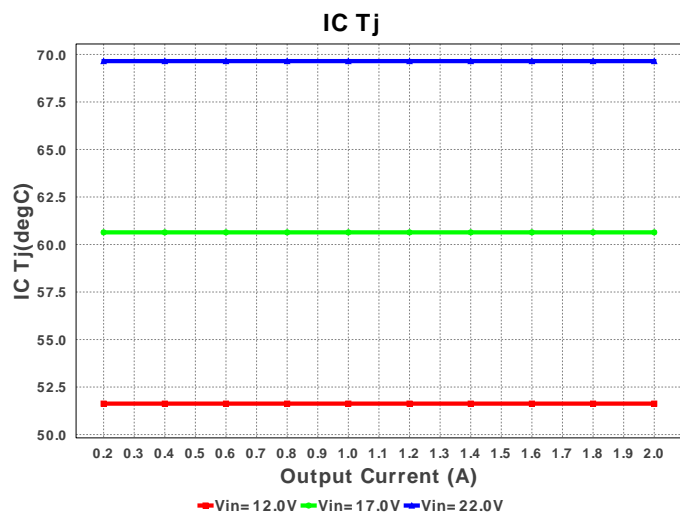
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Topology = Buck
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BOM Count = 22
Total Pd = 0.62W

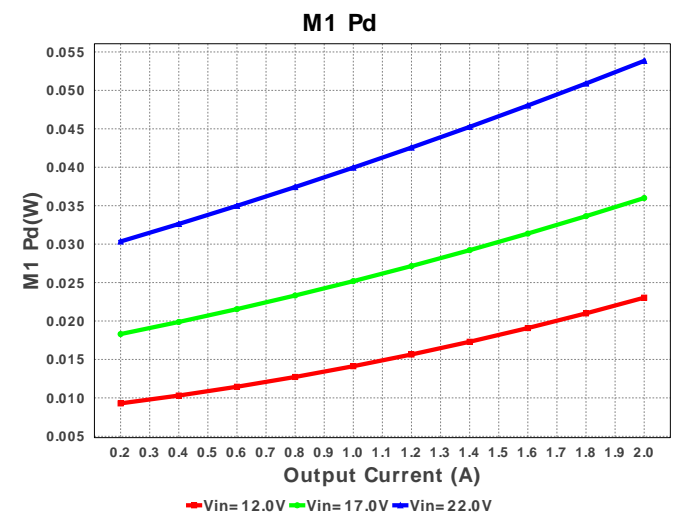
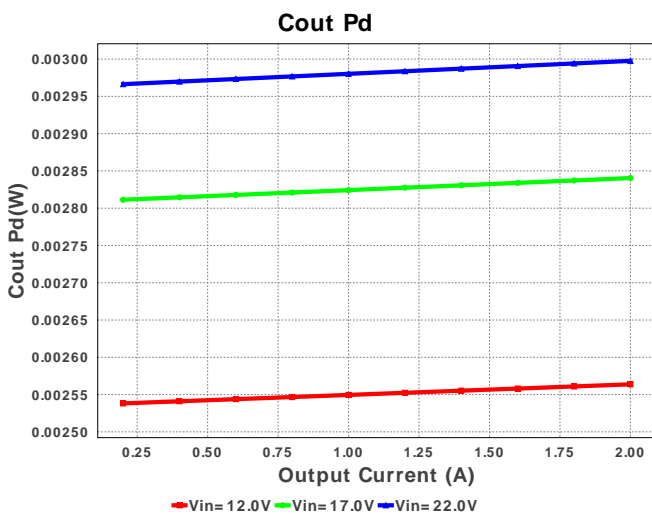
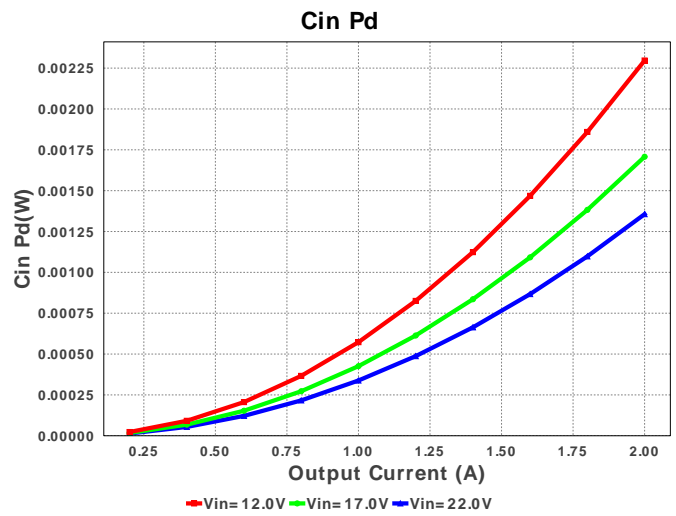
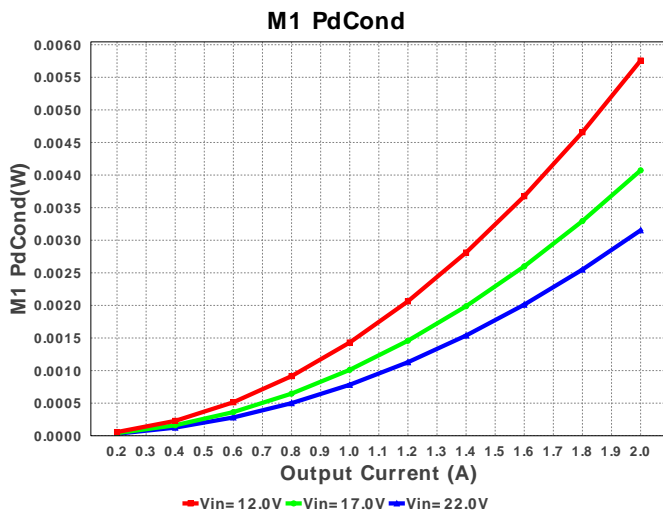
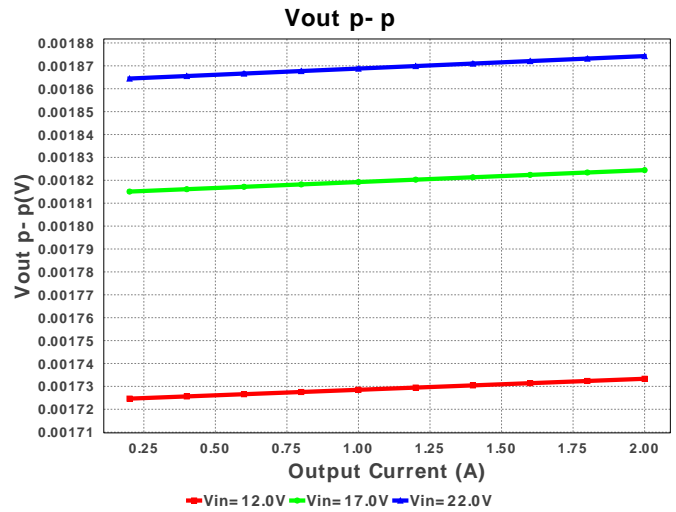
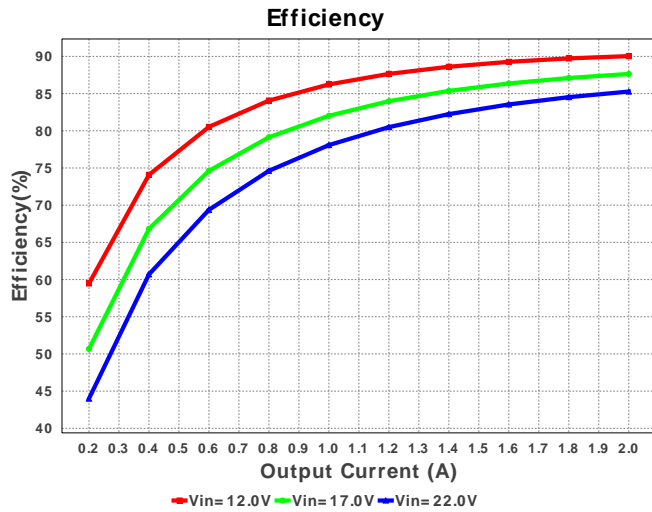


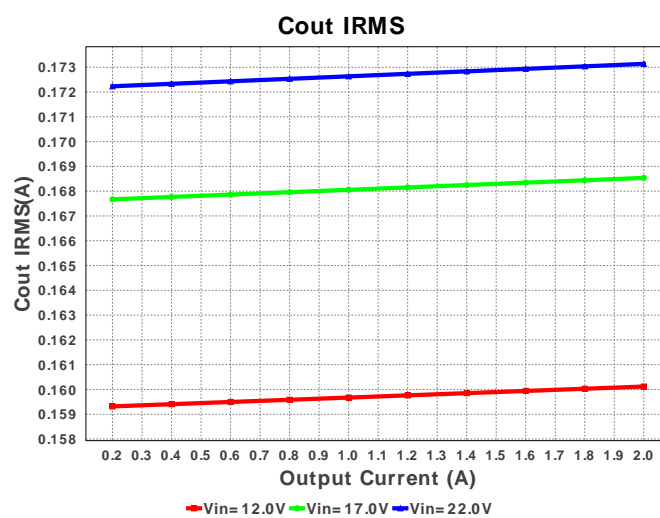
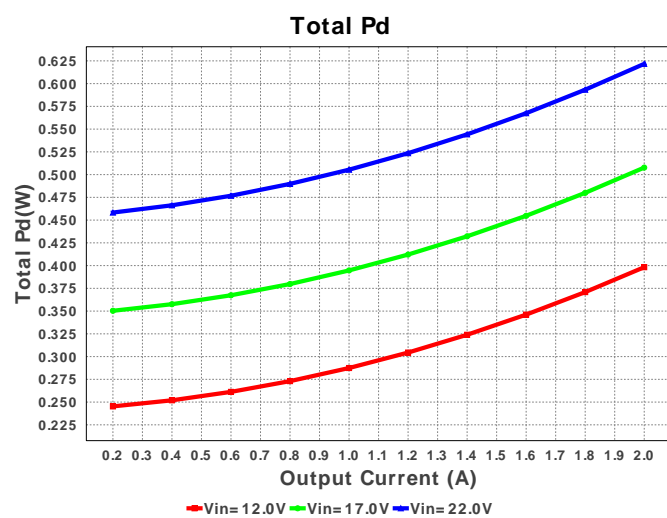
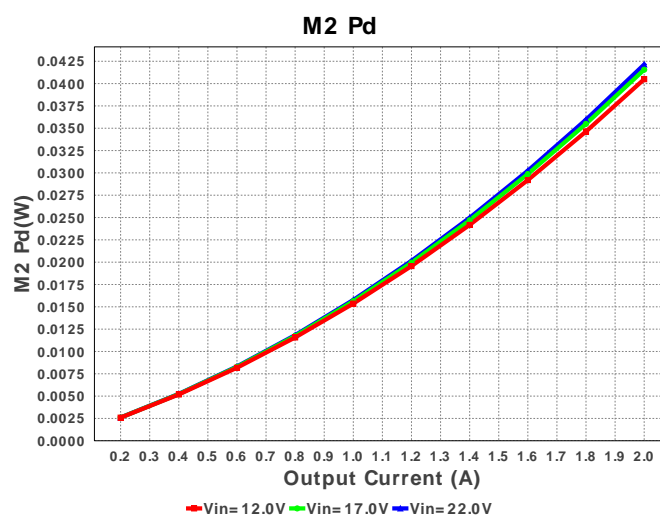
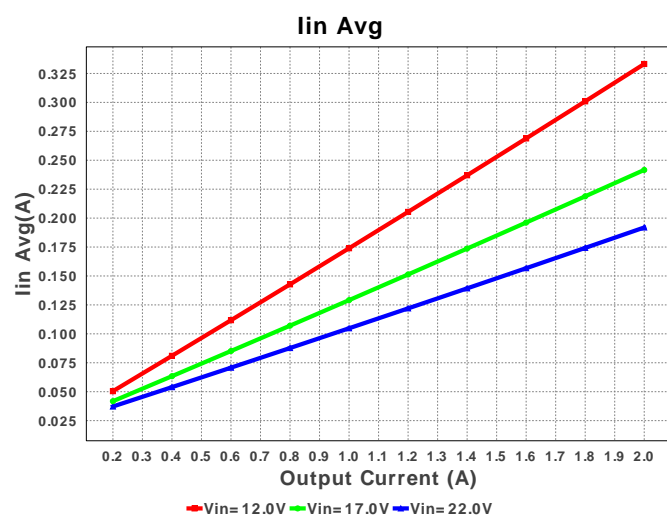
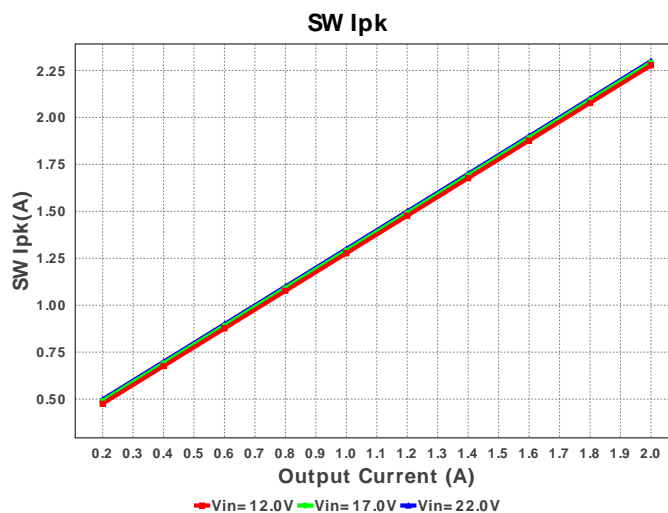
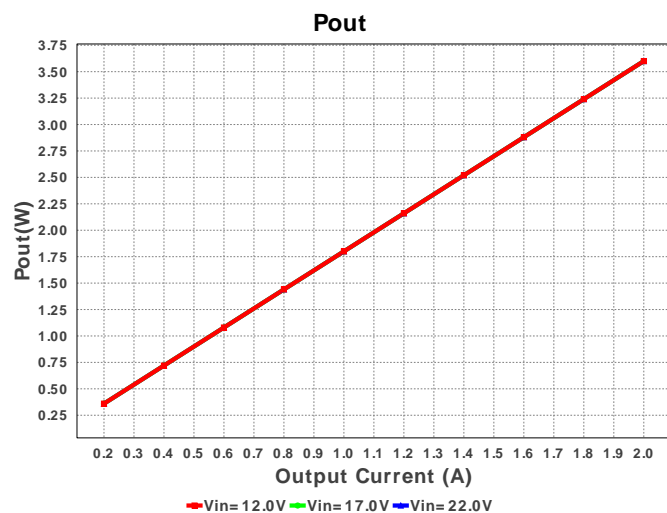
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	CV5IN	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm ²
2.	Cbst	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
3.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	1206_190 11 mm ²
4.	Cldoin	Taiyo Yuden	LMK212BJ106KG-T Series= X5R	Cap= 10.0 uF VDC= 10.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
5.	Cout	Vishay-Sprague	593D107X0010D2TE3 Series= 593D	Cap= 100.0 uF ESR= 100.0 mOhm VDC= 10.0 V IRMS= 1.22 A	1	\$0.27	7343-31 59 mm ²
6.	Csnub	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	Cvrefin	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
8.	Cvrefin2	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
9.	Cvt	Taiyo Yuden	LMK212BJ106KG-T Series= X5R	Cap= 10.0 uF VDC= 10.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
10.	Cvtref	MuRata	GRM155C80G224KE01D Series= X6S	Cap= 220.0 nF VDC= 4.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²

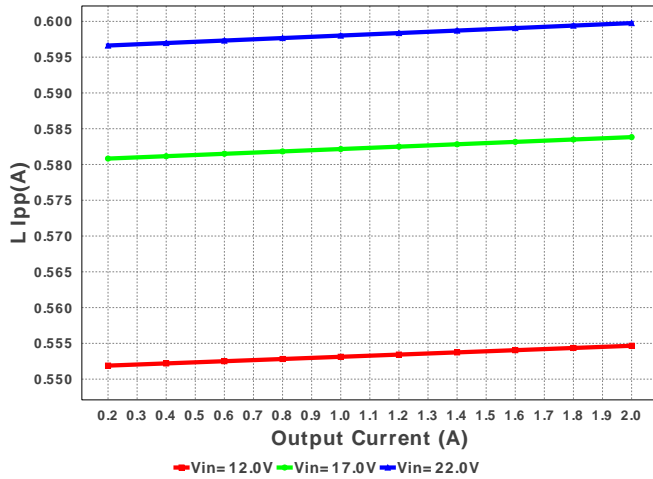
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	L1	Coiltronics	DR1040-7R0-R	L= 7.0 μ H DCR= 20.0 mOhm	1	\$0.56	 DR1040 154 mm ²
12.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 50.0 Amps	1	\$0.34	 TRANS_NexFET_Q3 18 mm ²
13.	M2	Texas Instruments	CSD18531Q5A	VdsMax= 60.0 V IdsMax= 100.0 Amps	1	\$0.90	 TRANS_NexFET_Q5A 55 mm ²
14.	Rbst	Vishay-Dale	CRCW04023R01FKED Series= CRCW..e3	Res= 3.01 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
15.	Rmode	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
16.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rrefin	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rrefin2	Vishay-Dale	CRCW0402619KFKED Series= CRCW..e3	Res= 619.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	Rsnub	Vishay-Dale	CRCW04024R87FKED Series= CRCW..e3	Res= 4.87 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
20.	Rtrip	Vishay-Dale	CRCW040210K7FKED Series= CRCW..e3	Res= 10.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Rvtt	Vishay-Dale	CRCW0402909KFKED Series= CRCW..e3	Res= 909.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
22.	U1	Texas Instruments	TPS51216RUKR	Switcher	1	\$1.00	 RUK0020B 16 mm ²



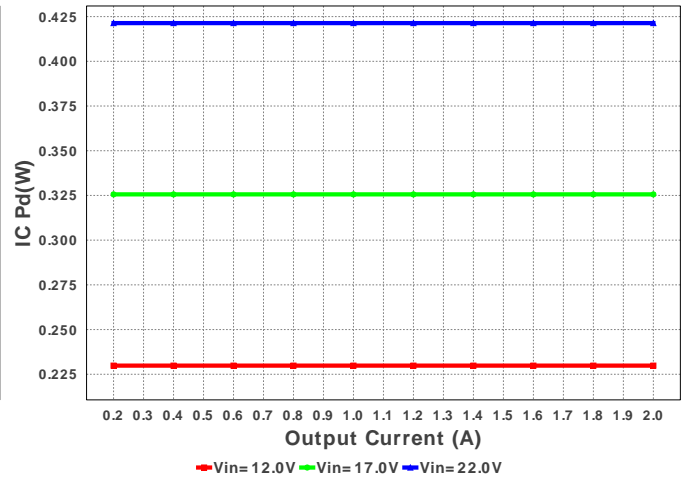




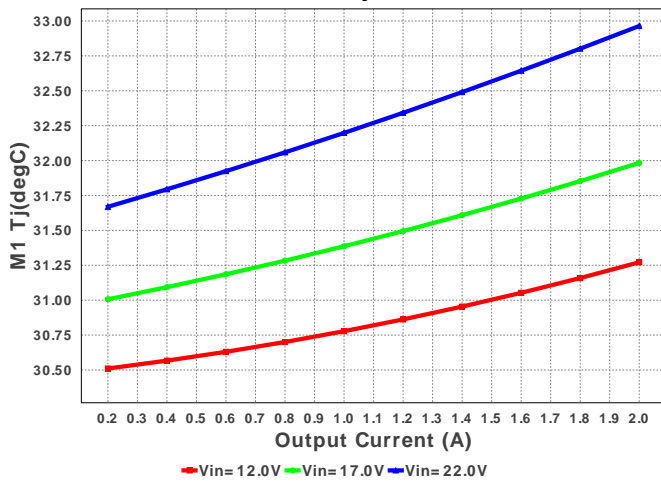
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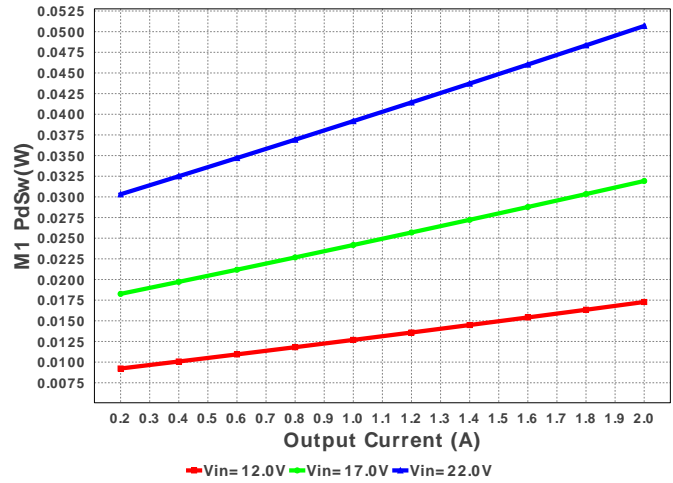
IC Pd



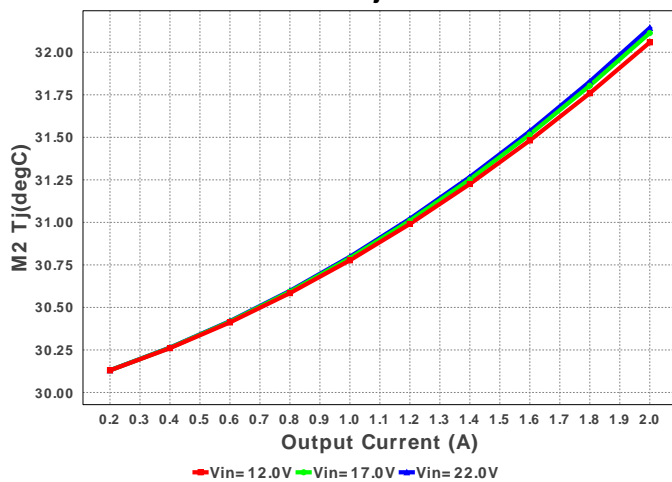
M1 Tj



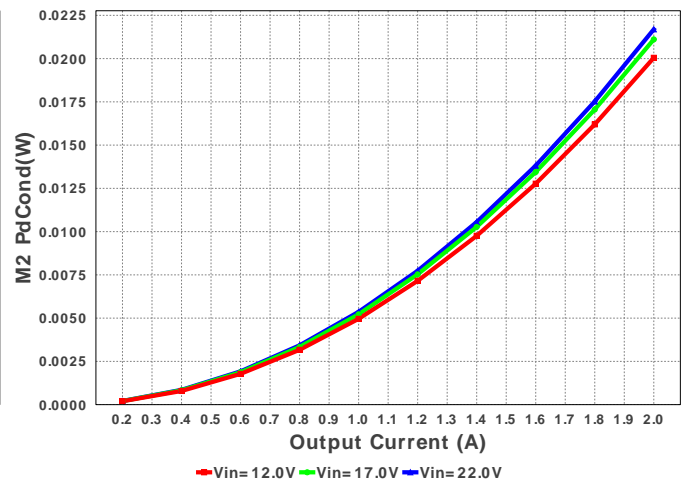
M1 PdSw

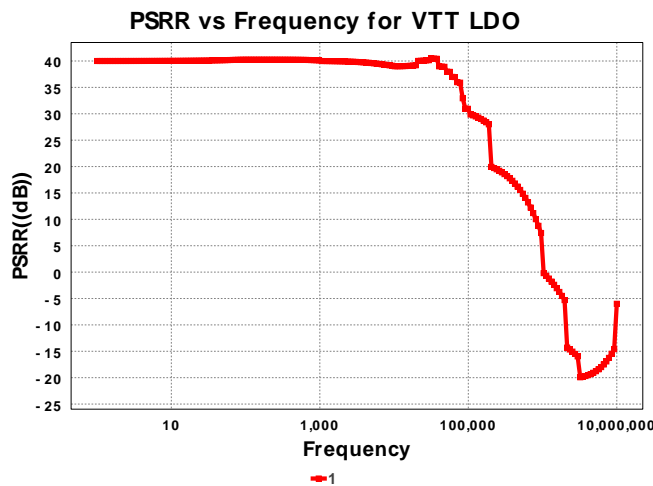


M2 Tj



M2 PdCond





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	552.173 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	173.136 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	191.9 mA	Current	Average input current
4.	L Ipp	599.76 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	2.3 A	Current	Peak switch current
6.	BOM Count	22	General	Total Design BOM count
7.	FootPrint	387.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	400.0 kHz	General	Switching frequency
9.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
10.	Pout	3.6 W	General	Total output power
11.	Total BOM	\$3.33	General	Total BOM Cost
12.	VTT LDO Power Dissipation	0.0 W	OP_Point	VTT LDO power dissipation
13.	Vout OP	1.8 V	Op_Point	Operational Output Voltage
14.	Duty Cycle	8.314 %	Op_point	Duty cycle
15.	Efficiency	85.274 %	Op_point	Steady state efficiency
16.	IC Tj	69.651 degC	Op_point	IC junction temperature
17.	IOUT_OP	2.0 A	Op_point	Iout operating point
18.	M1 Tj	32.964 degC	Op_point	M1 MOSFET junction temperature
19.	M2 Tj	32.144 degC	Op_point	M2 MOSFET junction temperature
20.	VIN_OP	22.0 V	Op_point	Vin operating point
21.	Vout p-p	1.874 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	1.356 mW	Power	Input capacitor power dissipation
23.	Cout Pd	2.998 mW	Power	Output capacitor power dissipation
24.	IC Pd	421.366 mW	Power	IC power dissipation
25.	L Pd	100.0 mW	Power	Inductor power dissipation
26.	M1 Pd	53.84 mW	Power	M1 MOSFET total power dissipation
27.	M1 PdCond	3.154 mW	Power	M1 MOSFET conduction losses
28.	M1 PdSw	50.687 mW	Power	M1 MOSFET switching losses
29.	M2 Pd	42.142 mW	Power	M2 MOSFET total power dissipation
30.	M2 PdCond	21.697 mW	Power	M2 MOSFET conduction losses
31.	M2 PdSw	20.445 mW	Power	M2 MOSFET switching losses
32.	Total Pd	621.702 mW	Power	Total Power Dissipation
33.	Vout Tolerance	555.556 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	12.0	Minimum input voltage
4.	Vout	1.8	Output Voltage
5.	base_pn	TPS51216	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature
1.	Vout Sch	1.8	Output voltage selected

Design Assistance

1. **TPS51216** Product Folder : <http://www.ti.com/product/tps51216> : contains the data sheet and other resources.

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