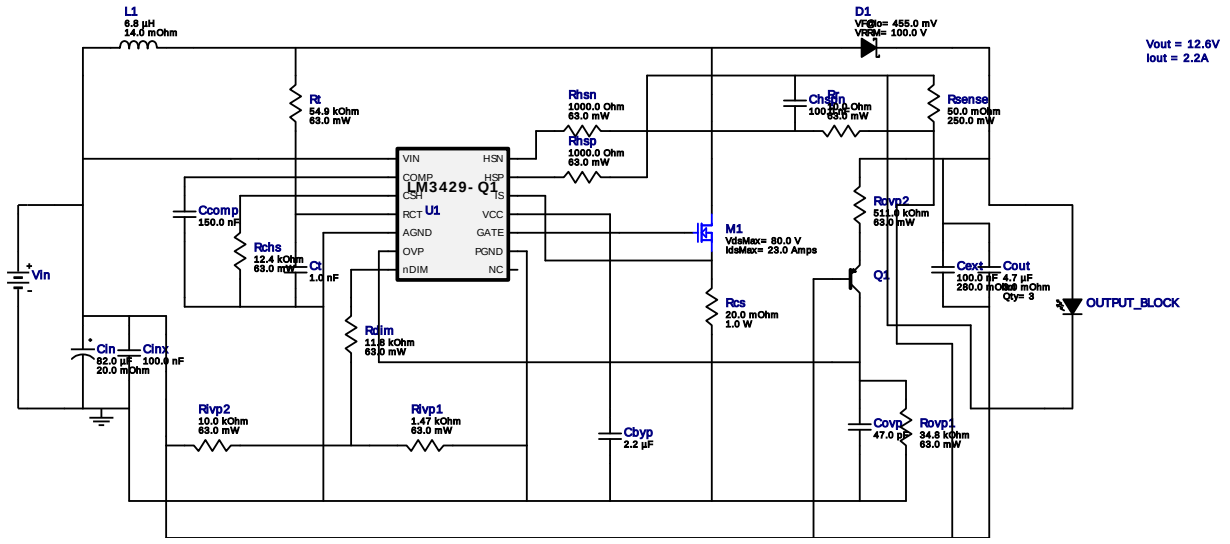
WEBENCH® Design Report

VinMin = 11.0V
VinMax = 22.0V
Vout = 12.6V
Iout = 2.2A

Device = LM3429Q1MH/NOPB
Topology = Buck_Boost
Created = 4/26/16 7:29:53 PM
BOM Cost = $0.00
BOM Count = 29
Total Pd = 2.27W

Design : 4102490/37 LM3429Q1MH/NOPB
LM3429Q1MH/NOPB 11.0V-22.0V to 12.60V @ 1.9919254838709675A



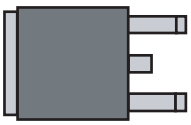
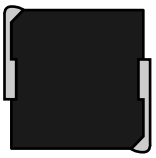
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.View WEBENCH(R) Disclaimer.

My Comments

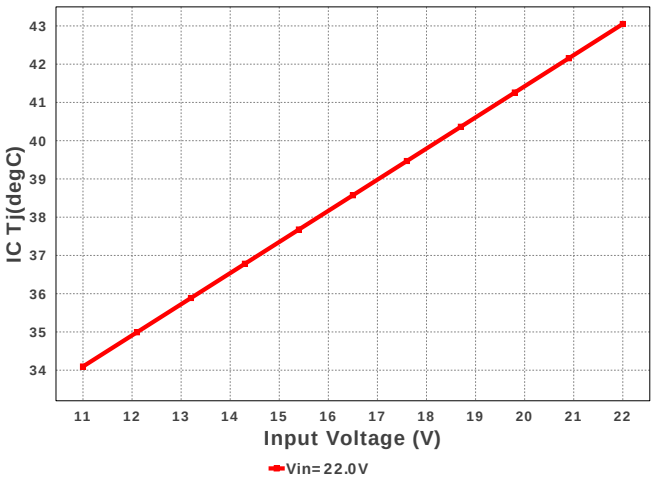
TO MODIFY FOR BOOST ONLY REMOVE Q1 CONNECT LED TO GROUND NOT RSENSE

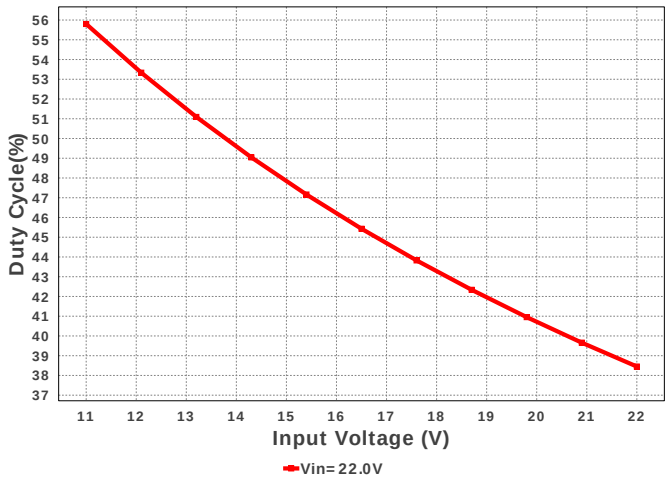
Electrical BOM

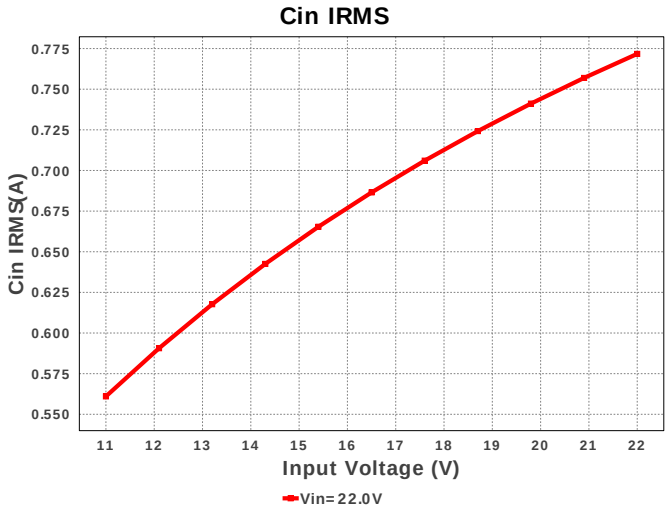
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 uF VDC= 16.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Ccomp	MuRata	GRM155R60J154KE01D Series= X5R	Cap= 150.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Cext	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Chspn	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	Cin	Panasonic	35SVPF82M Series= SVPF	Cap= 82.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 4.0 A	1	$0.61	CAPSMT_62_E12 106 mm²
6.	Cinx	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
7.	Cout	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	3	$0.07	1206 11 mm²

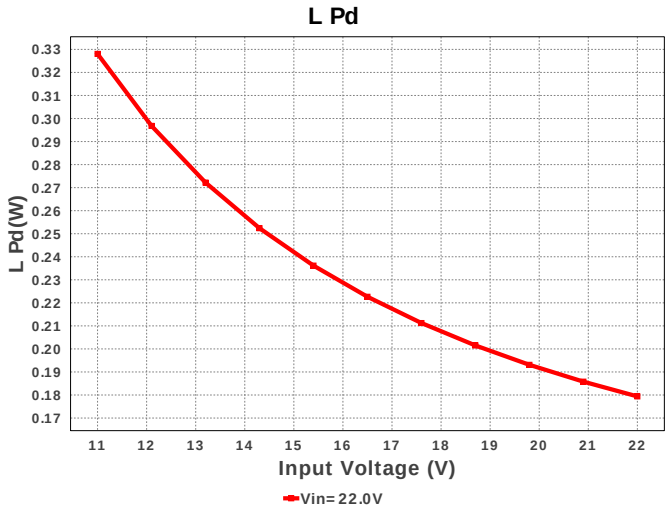
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Covp	Kemet	C0805C470K5GACTU Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
9.	Ct	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
10.	D1	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	$1.33	 DDPAK 210 mm²
11.	D_LED	CUSTOM	CUSTOM	LED	1	NA	CUSTOM 0 mm²
12.	L1	Bourns	SRP1270-6R8M	L= 6.8 µH DCR= 14.0 mOhm	1	$0.60	 SRP1270 246 mm²
13.	M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	$0.19	 PG-TDSON-8 55 mm²
14.	Q1	Diodes Inc.	MMBT3906-7-F	Bipolar Transistor	1	$0.02	 SOT-23 14 mm²
15.	Rchs	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rcs	Susumu Co Ltd	PRL1632-R020-F-T1 Series= PRL1632	Res= 20.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 0612 11 mm²
17.	Rdim	Vishay-Dale	CRCW040211K8FKED Series= CRCW..e3	Res= 11.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
18.	Rhsn	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
19.	Rhsp	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rivp1	Vishay-Dale	CRCW04021K47FKED Series= CRCW..e3	Res= 1.47 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
21.	Rivp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
22.	Rovp1	Vishay-Dale	CRCW040234K8FKED Series= CRCW..e3	Res= 34.8 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
23.	Rovp2	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
24.	Rr	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
25.	Rsense	Bourns	CRM0805-FW-R050ELF Series= ?	Res= 50.0 mOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.10	 0805 7 mm²
26.	Rt	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²

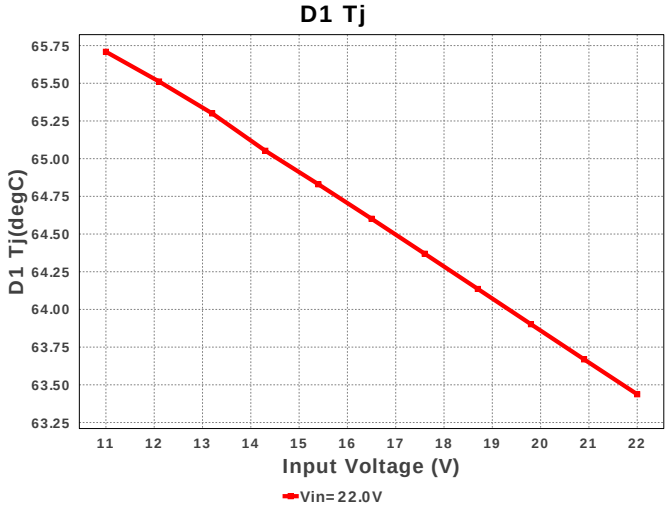
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
27.	U1	Texas Instruments	LM3429Q1MH/NOPB	Switcher	1	$1.35	MXA14A 59 mm²

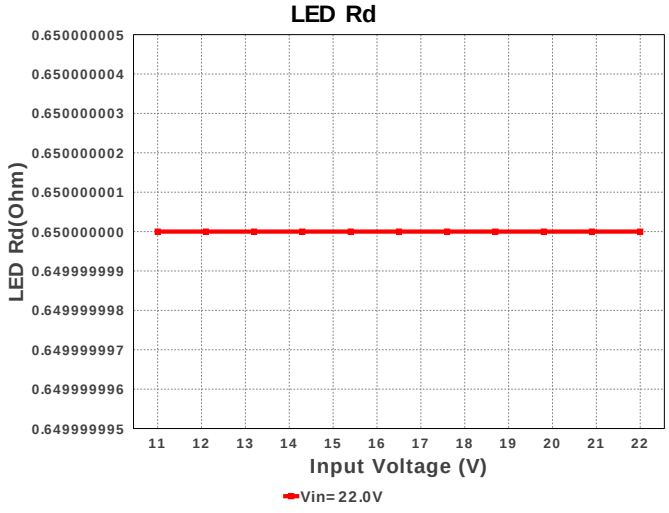




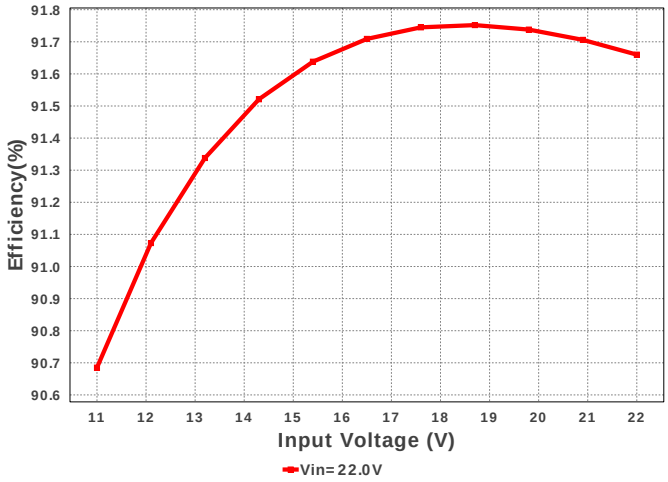




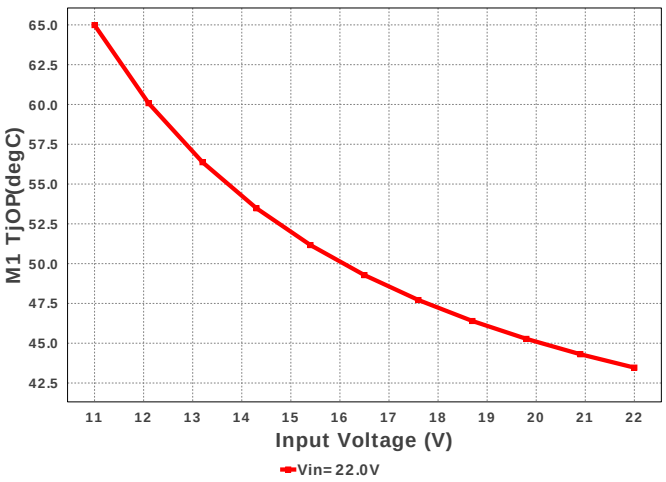




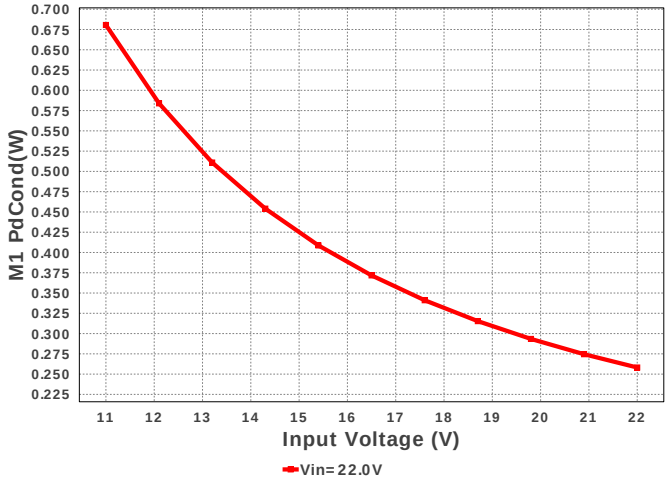
Efficiency



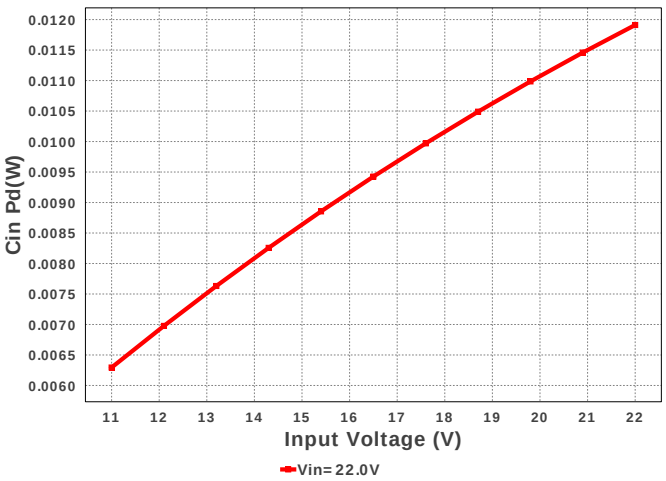
M1 TjOP



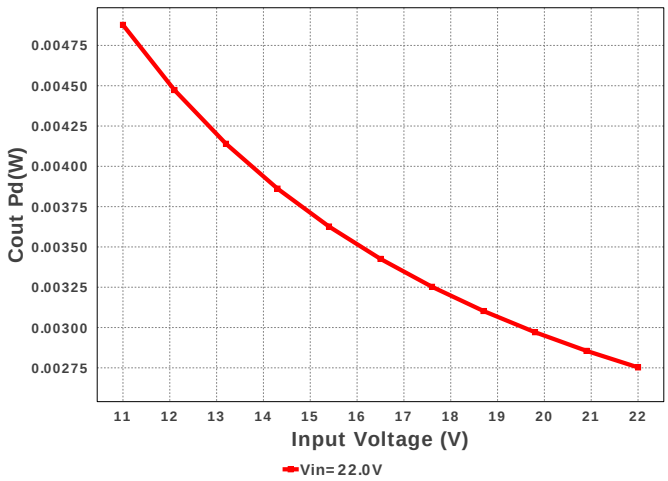
M1 PdCond



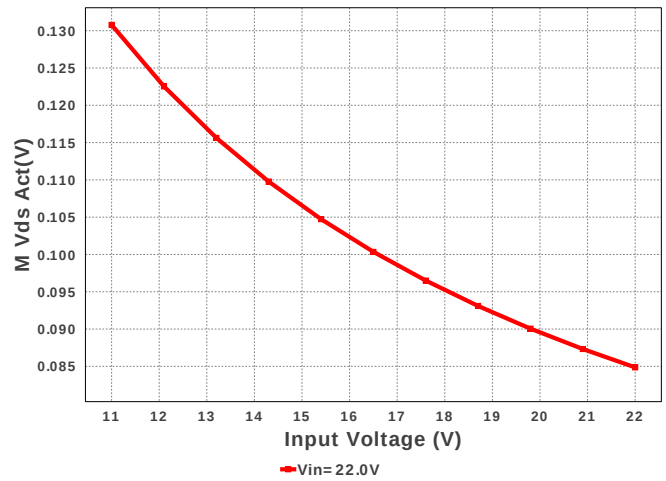
Cin Pd

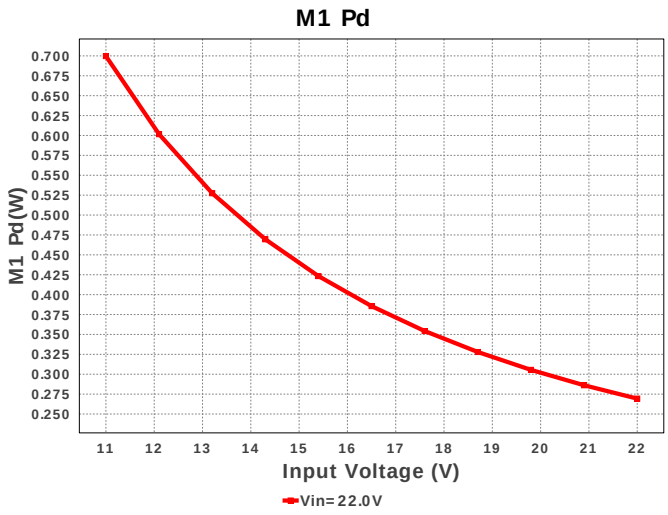


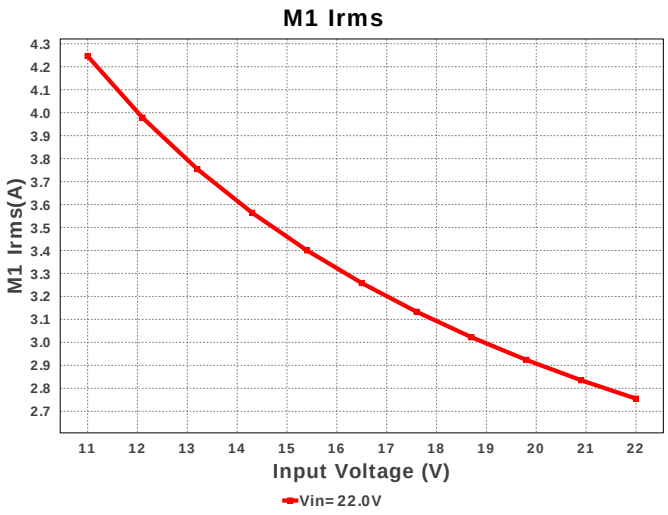
Cout Pd

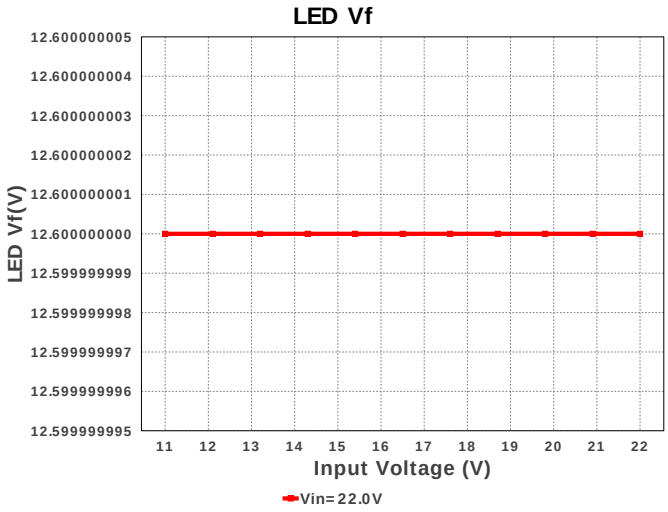


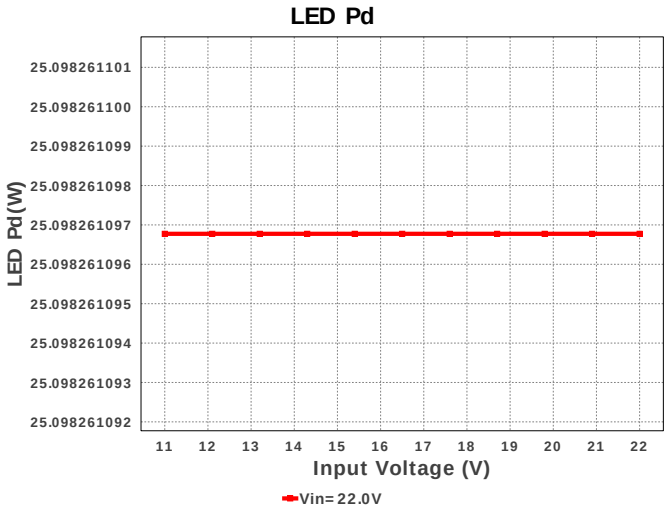
M Vds Act

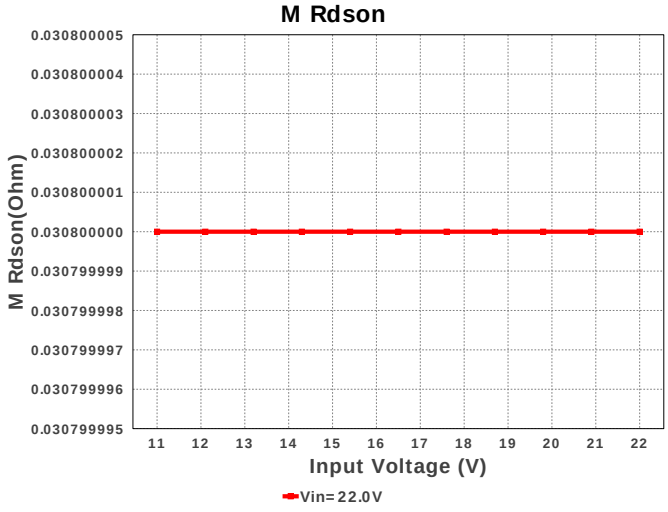


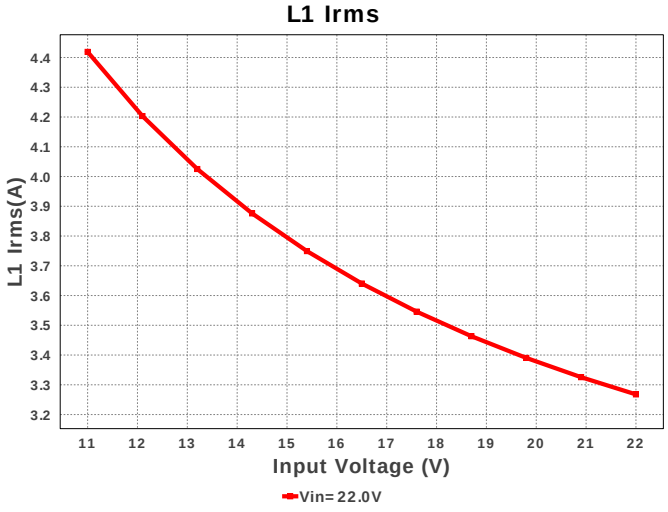


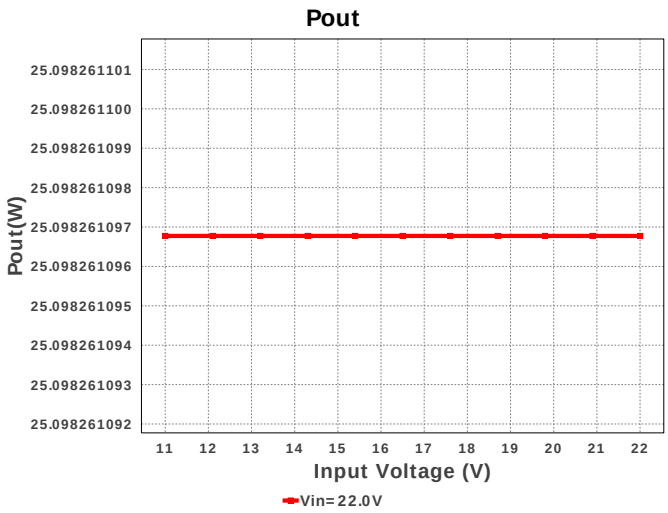


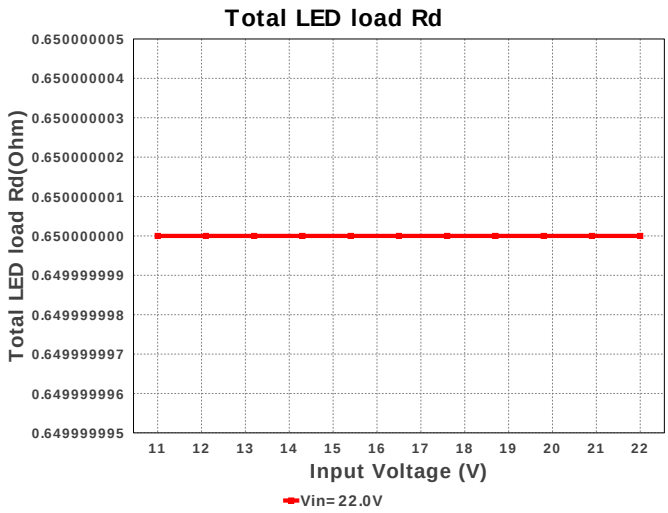


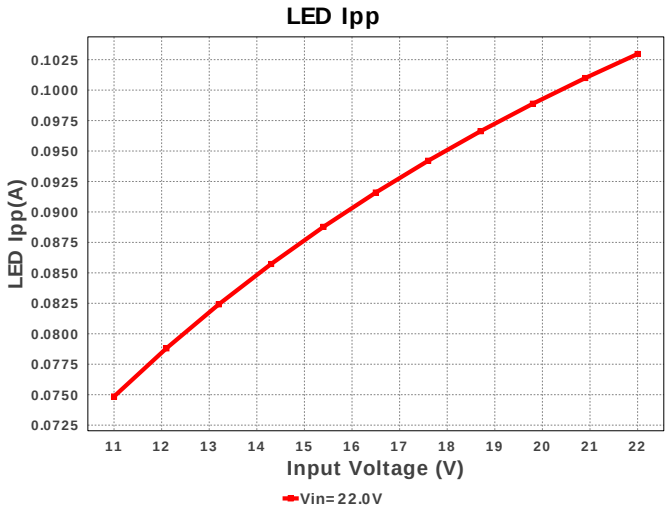


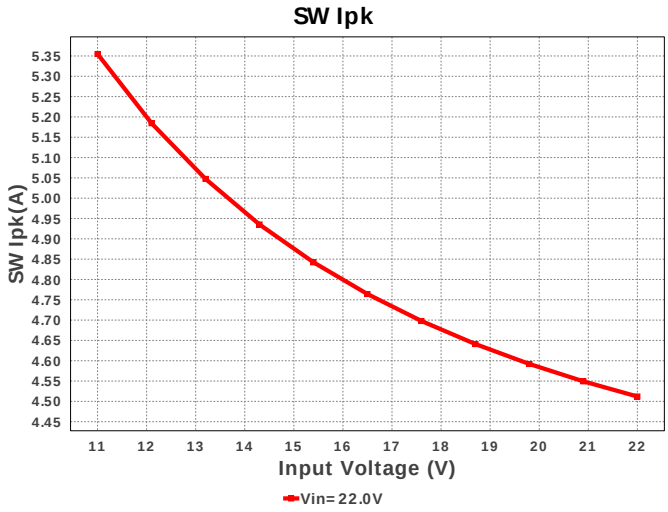


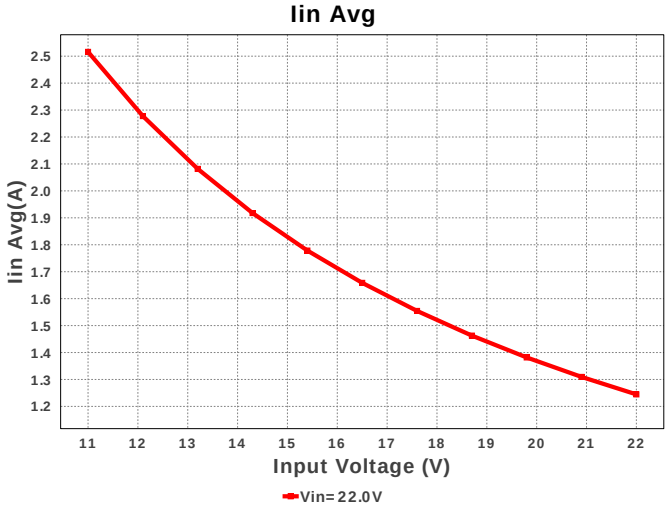


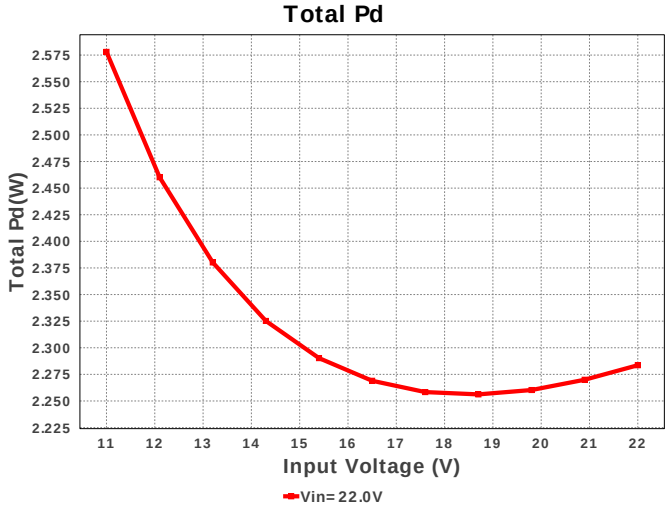


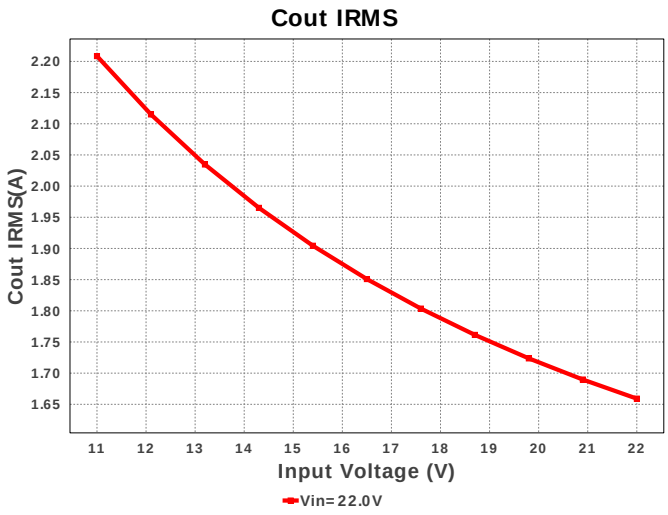


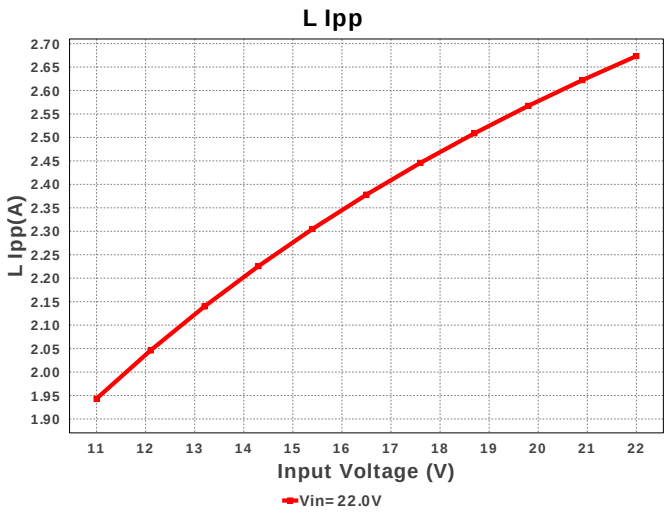


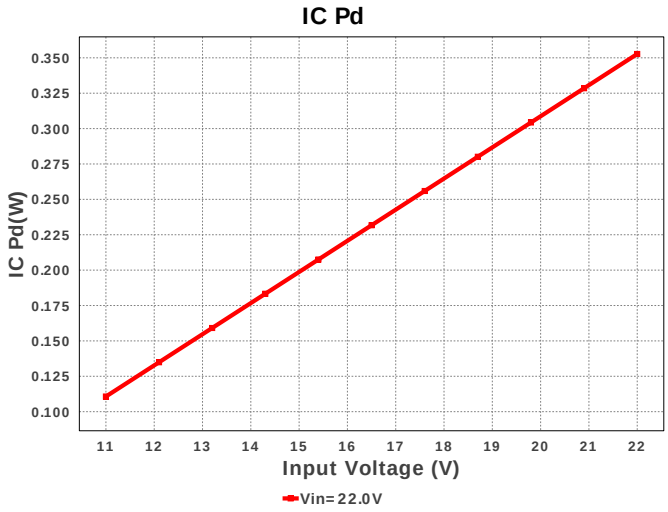


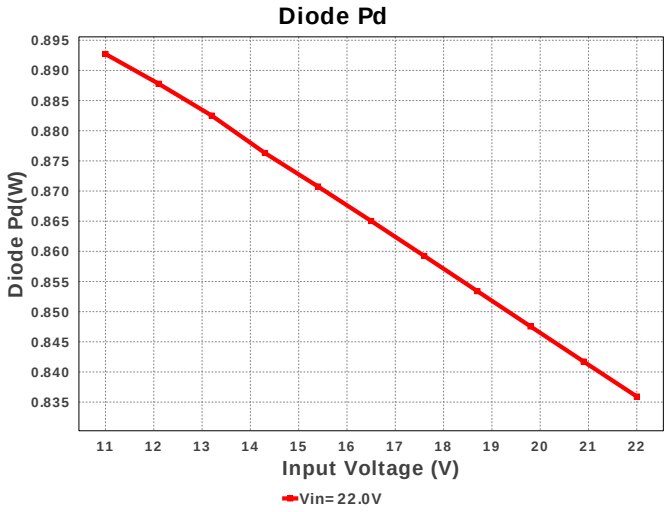


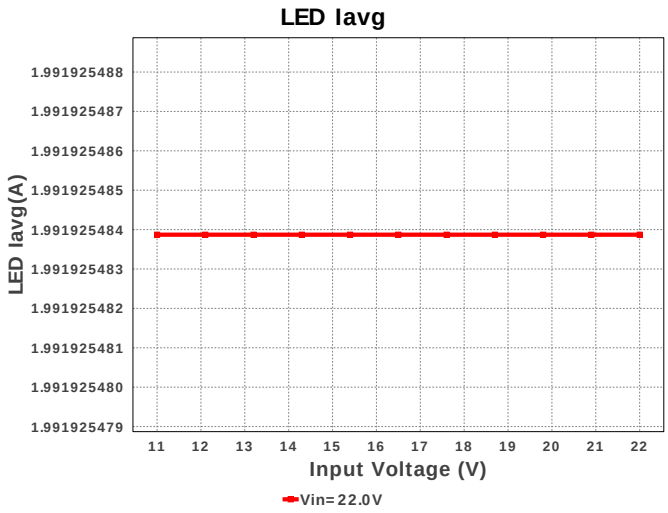


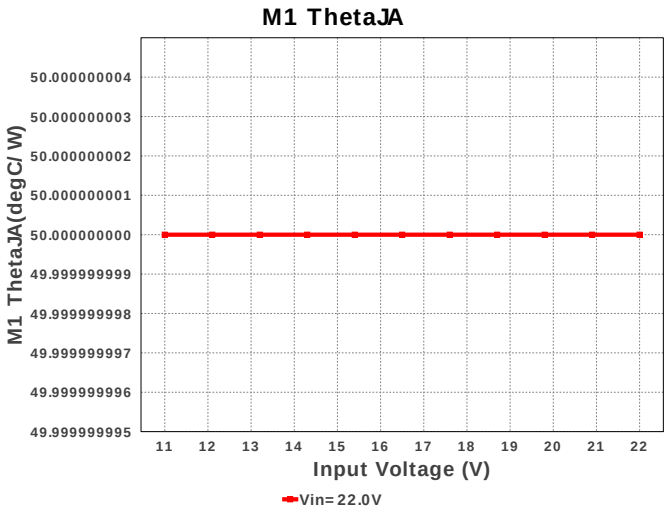


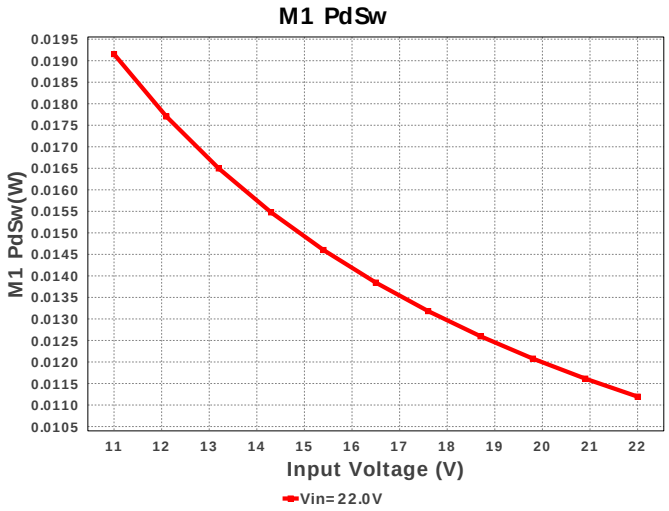












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	563.988 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	2.2 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	2.488 A	Current	Average input current
4.	L Ipp	1.954 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	4.398 A	Current	Inductor ripple current
6.	LED Iavg	1.992 A	Current	LED Average Current
7.	LED Ipp	75.248 mA	Current	LED Ripple Current
8.	M1 Irms	4.237 A	Current	M1 MOSFET Irms
9.	SW Ipk	5.339 A	Current	Peak switch current
10.	BOM Count	29	General	Total Design BOM count
11.	FootPrint	812.0 mm^2	General	Total Foot Print Area of BOM components
12.	Frequency	450.82 kHz	General	Switching frequency
13.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
14.	M Rdson	6.8 mOhm	General	Drain-Source On-resistance
15.	M Vds Act	28.814 mV	General	M Vds
16.	M1 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
17.	Pout	25.098 W	General	Total output power
18.	Total BOM	$0.0	General	Total BOM Cost
19.	D1 Tj	66.253 degC	Op_Point	D1 junction temperature
20.	Vout OP	12.6 V	Op_Point	Operational Output Voltage
21.	Duty Cycle	55.529 %	Op_point	Duty cycle
22.	Efficiency	91.697 %	Op_point	Steady state efficiency
23.	IC Tj	37.137 degC	Op_point	IC junction temperature
24.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	1.992 A	Op_point	Iout operating point
26.	LED Rd	650.0 mOhm	Op_point	LED DynamicResistance
27.	LED Vf	12.6 V	Op_point	Total LED Forward Calculated Voltage
28.	M1 TjOP	41.15 degC	Op_point	M1 MOSFET junction temperature
29.	VIN_OP	11.0 V	Op_point	Vin operating point
30.	Cin Pd	6.362 mW	Power	Input capacitor power dissipation
31.	Cout Pd	4.84 mW	Power	Output capacitor power dissipation
32.	Diode Pd	906.326 mW	Power	Diode power dissipation
33.	IC Pd	192.885 mW	Power	IC power dissipation
34.	L Pd	325.026 mW	Power	Inductor power dissipation
35.	LED Pd	25.098 W	Power	LED Power Dissipation
36.	M1 Pd	223.008 mW	Power	M1 MOSFET total power dissipation
37.	M1 PdCond	129.986 mW	Power	M1 MOSFET conduction losses
38.	M1 PdSw	93.022 mW	Power	M1 MOSFET switching losses
39.	Total Pd	2.273 W	Power	Total Power Dissipation
40.	Total LED load Rd	650.0 mOhm		Total LED Load DynamicResistance
41.	Vout Tolerance	198.413 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.2	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	12.6	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	LM3429-Q1	Base Product Number

#	Name	Value	Description
7.	LED_Architect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	Custom	LED Part number
10.	ledseries	1.0	Number of LED in series
11.	line_fsw	60.0	AC Line Frequency
12.	source	DC	Input Source Type
13.	Ta	30.0	Ambient temperature
14.	UserFsw	450.82 k	Customer Selected Frequency

Design Assistance

1. Feature Highlights: Automotive Qualified LED Driver. Please consult product datasheet for detailed specifications.

2. The LM3429-Q1 is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application

3. **LM3429-Q1** Product Folder : http://www.ti.com/product/LM3429%2DQ1 : contains the data sheet and other resources.