MOSFET Power Loss Calculator

The *MOSFET Power Loss Calculator* allows users to quickly choose *Power Block* or discrete MOSFET devices for a synchronous buck topology based on desired application parameters. The tool takes user-inputted values and a user-chosen controller to calculate estimated power losses of *Power Blocks* and discrete MOSFETs, provides all possible device options sorted by power loss in ascending order, and includes relative 1k prices and relevant parameters. Located on www.ti.com, the tool accompanies the MOSFET selection tool on each *Power Block* and discrete device webpage.

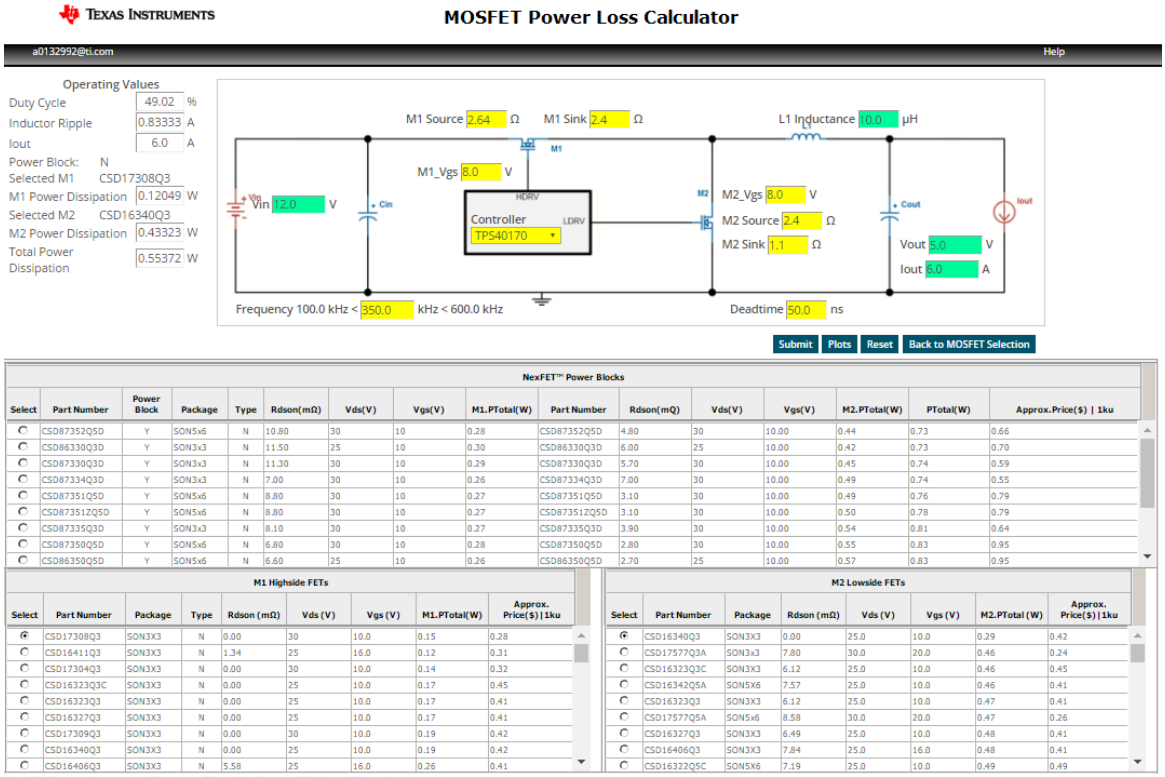
MOSFET Power Loss Calculator Tool

NOTE: The *Plots* function of the *MOSFET Power Loss Calculator* is only available on web browsers Google Chrome™ browser, Firefox®, and Internet Explorer® version 8 or higher.

User Instructions

Step 1. **Access the *MOSFET Power Loss Calculator* via specific Power MOSFET devices on www.ti.com**.

Once accessed, the *MOSFET Power Loss Calculator* opens as a separate page with default inputs for each parameter.



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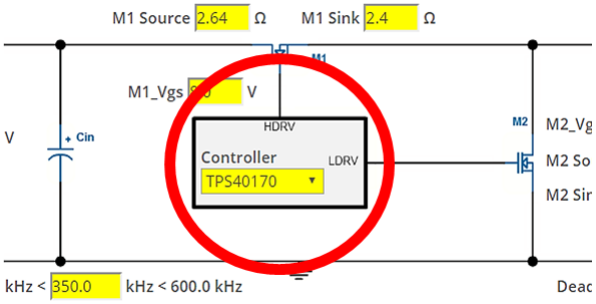
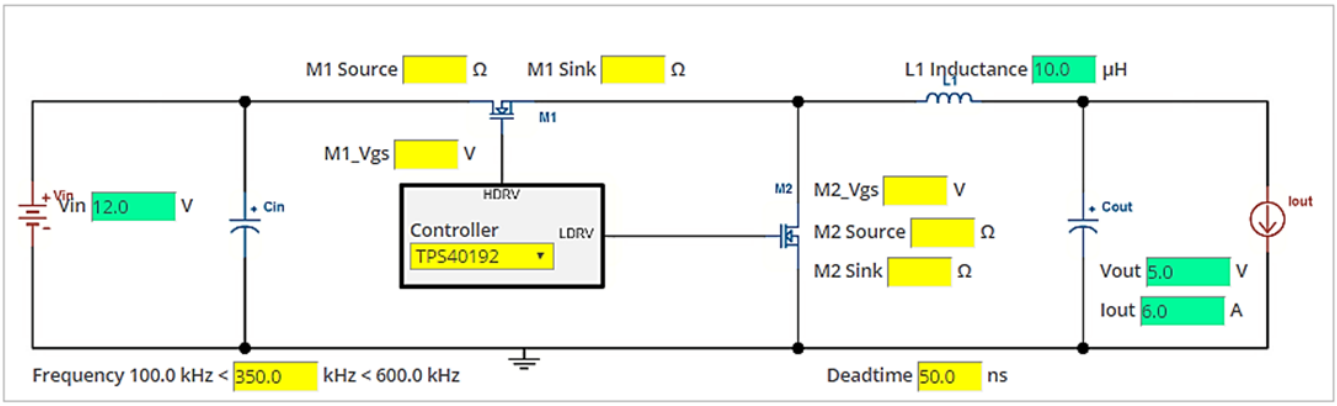
2. **Select the desired controller and click *Submit*.**

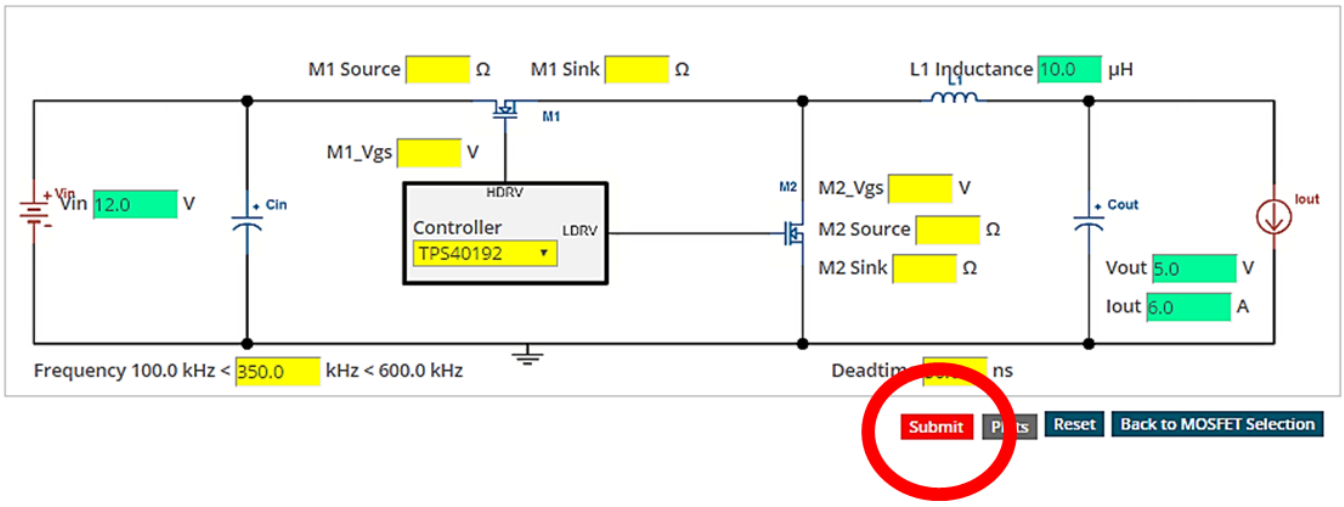
   The controller selection box lies in the center of the circuit. The drop-down arrow releases a list of controllers available. Click the down arrow and select the desired controller or the last option, *Custom*.



   After a controller is selected, some of the input boxes, which correspond to controller parameters, are empty.



   In order to populate the selected controller parameters with values, click the red *Submit* button, located in the bottom right corner below the circuit. Note that the *Submit* button is only red when a change is made.



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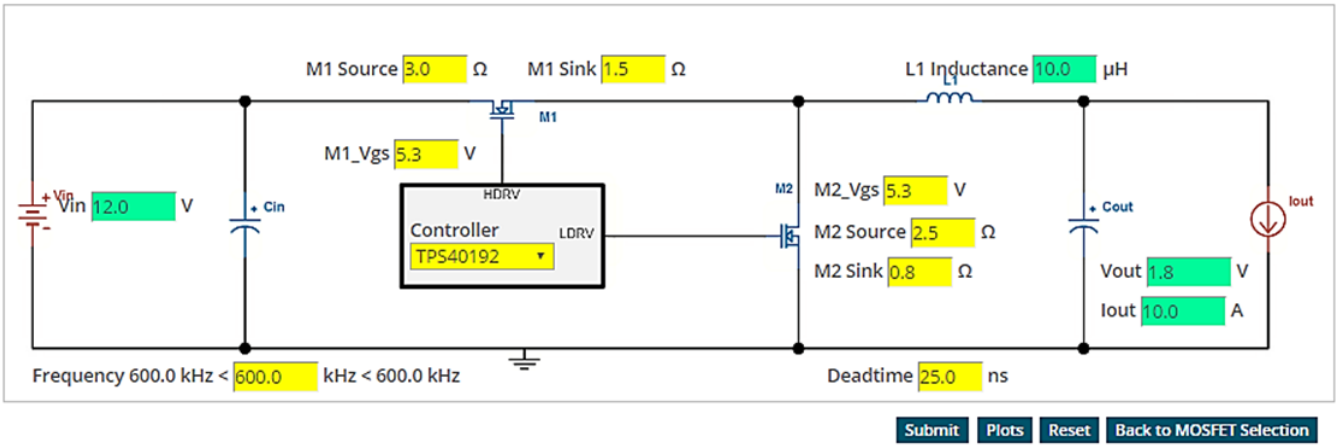
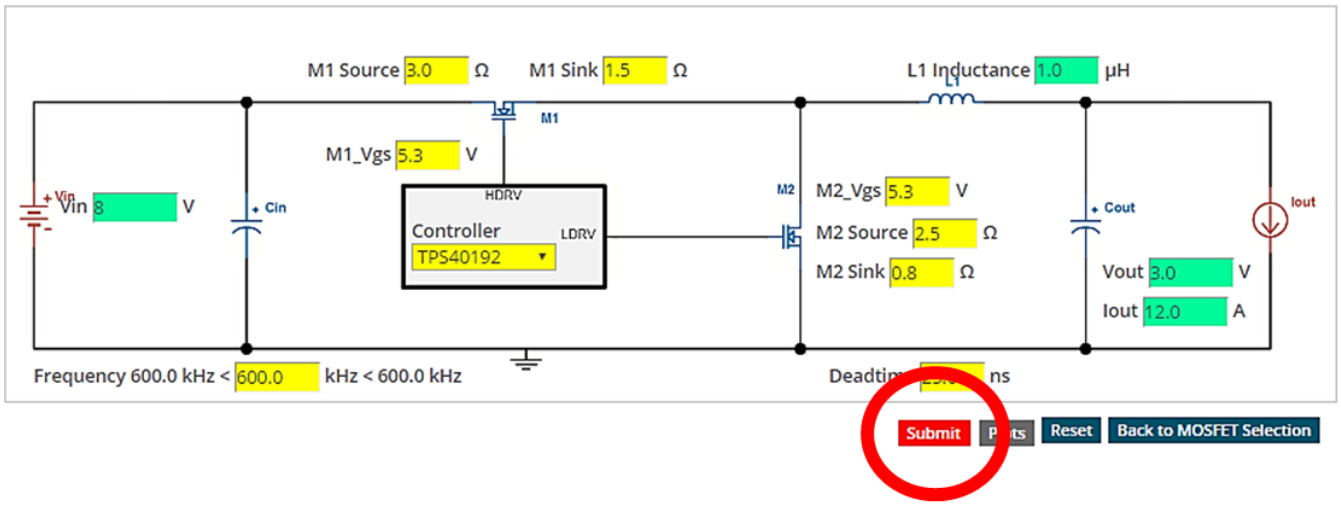
Values associated with the controller populate the yellow boxes after submission. Note the changes in all of the input boxes.



Step 2. **Adjust conditions and click *Submit*.**

Conditions in the green input boxes and the yellow frequency input box can be altered within the range of the controller. Once the parameters are changed to desired values, click the red *Submit* button.



NOTE: A warning box will caution adjustments to conditions outside the controller range, and the controller type in the center box automatically changes to *Custom*.

NOTE: If yellow input boxes (aside from the frequency box) are changed and submitted, the controller type automatically changes to *Custom*.

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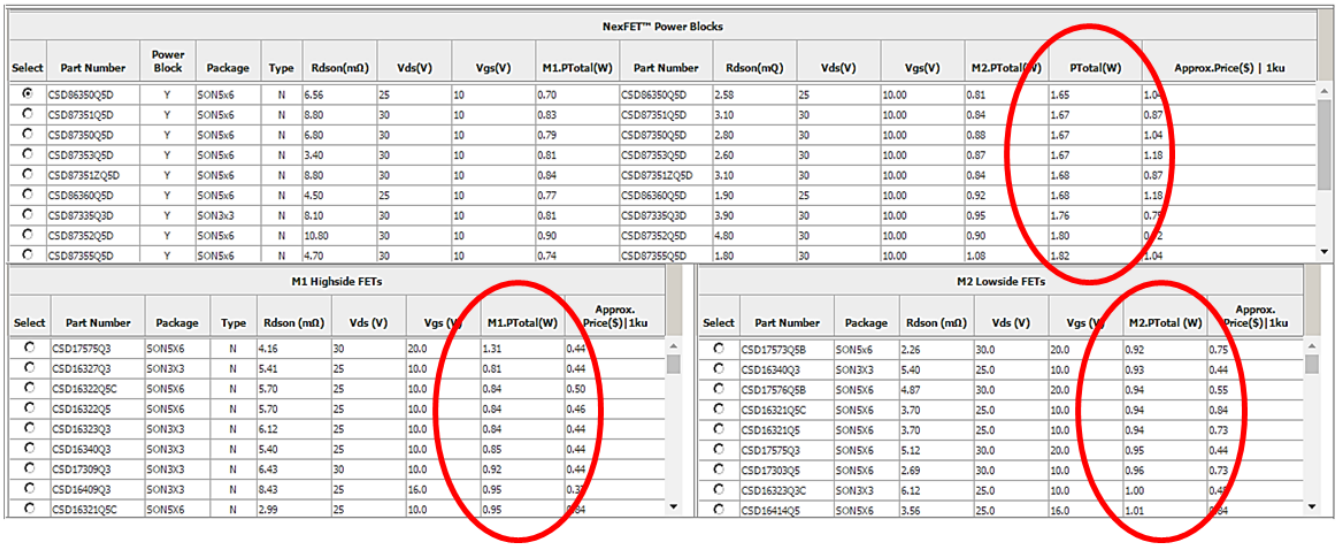
4. **Choose a *Power Block* or discrete pair and click *Submit* to obtain the total power loss.**

After condition submission, the *MOSFET Power Loss Calculator* provides suggestions for *Power Block* or discrete pair (M1 Highside and M2 Lowside pair) devices based on user input. The tool generates a list in power loss ascending order (best to worst performance).



NexFET™ Power Blocks

Select	Part Number	Power Block	Package	Type	Rdson(mΩ)	Vds(V)	Vgs(V)	M1.PTotal(W)	Part Number	Rdson(mΩ)	Vds(V)	Vgs(V)	M2.PTotal(W)	PTotal(W)	Approx.Price($) | 1ku
◉	CSD86350Q5D	Y	SON5x6	N	6.56	25	10	0.70	CSD86350Q5D	2.58	25	10.00	0.81	1.65	1.04
○	CSD87351Q5D	Y	SON5x6	N	8.80	30	10	0.83	CSD87351Q5D	3.10	30	10.00	0.84	1.67	0.87
○	CSD87350Q5D	Y	SON5x6	N	6.80	30	10	0.79	CSD87350Q5D	2.80	30	10.00	0.88	1.67	1.04
○	CSD87353Q5D	Y	SON5x6	N	3.40	30	10	0.81	CSD87353Q5D	2.60	30	10.00	0.87	1.67	1.18
○	CSD87351ZQ5D	Y	SON5x6	N	8.80	30	10	0.84	CSD87351ZQ5D	3.10	30	10.00	0.84	1.68	0.87
○	CSD86360Q5D	Y	SON5x6	N	4.50	25	10	0.77	CSD86360Q5D	1.90	25	10.00	0.92	1.68	1.18
○	CSD87335Q3D	Y	SON3x3	N	8.10	30	10	0.81	CSD87335Q3D	3.90	30	10.00	0.95	1.76	0.75
○	CSD87352Q5D	Y	SON5x6	N	10.80	30	10	0.90	CSD87352Q5D	4.80	30	10.00	0.90	1.80	0.72
○	CSD87355Q5D	Y	SON5x6	N	4.70	30	10	0.74	CSD87355Q5D	1.80	30	10.00	1.08	1.82	1.04

M1 Highside FETs

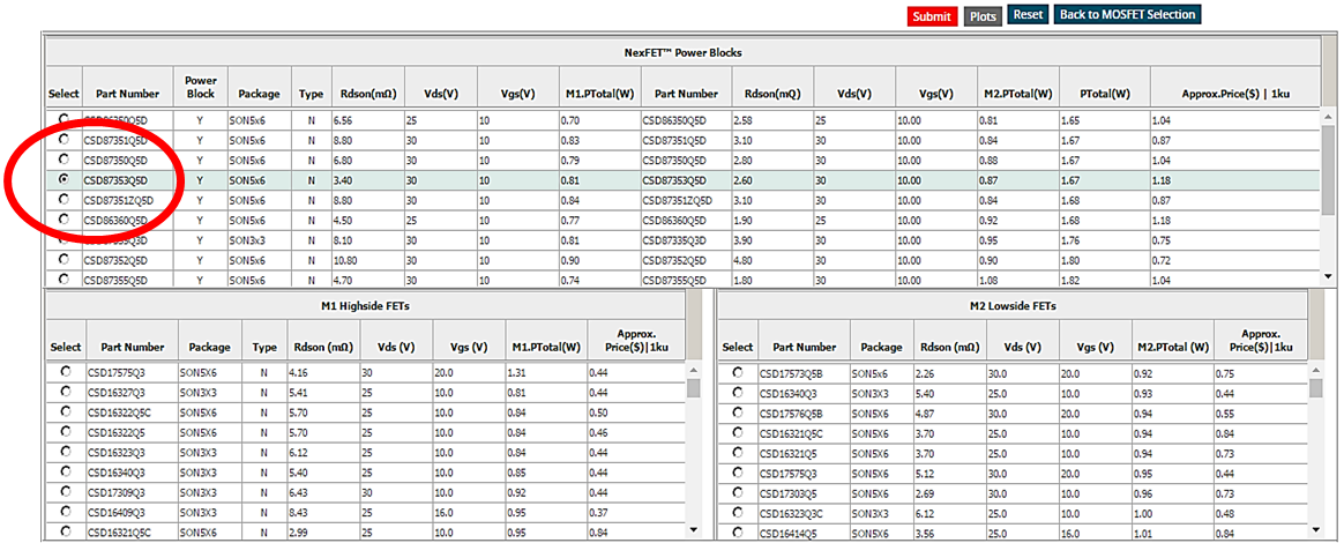
Select	Part Number	Package	Type	Rdson (mΩ)	Vds (V)	Vgs (V)	M1.PTotal(W)	Approx. Price($)|1ku
○	CSD17575Q3	SON5X6	N	4.16	30	20.0	1.31	0.44
○	CSD16327Q3	SON3X3	N	5.41	25	10.0	0.81	0.44
○	CSD16322Q5C	SON5X6	N	5.70	25	10.0	0.84	0.50
○	CSD16322Q5	SON5X6	N	5.70	25	10.0	0.84	0.46
○	CSD16323Q3	SON3X3	N	6.12	25	10.0	0.84	0.44
○	CSD16340Q3	SON3X3	N	5.40	25	10.0	0.85	0.44
○	CSD17309Q3	SON3X3	N	6.43	30	10.0	0.92	0.44
○	CSD16409Q3	SON3X3	N	8.43	25	16.0	0.95	0.37
○	CSD16321Q5C	SON5X6	N	2.99	25	10.0	0.95	0.84

M2 Lowside FETs

Select	Part Number	Package	Rdson (mΩ)	Vds (V)	Vgs (V)	M2.PTotal (W)	Approx. Price($)|1ku
○	CSD17573Q5B	SON5x6	2.26	30.0	20.0	0.92	0.75
○	CSD16340Q3	SON3X3	5.40	25.0	10.0	0.93	0.44
○	CSD17576Q5B	SON5X6	4.87	30.0	20.0	0.94	0.55
○	CSD16321Q5C	SON5X6	3.70	25.0	10.0	0.94	0.84
○	CSD16321Q5	SON5X6	3.70	25.0	10.0	0.94	0.73
○	CSD17575Q3	SON5X6	5.12	30.0	20.0	0.95	0.44
○	CSD17303Q5	SON5X6	2.69	30.0	10.0	0.96	0.73
○	CSD16323Q3C	SON3X3	6.12	25.0	10.0	1.00	0.48
○	CSD16414Q5	SON5X6	3.56	25.0	16.0	1.01	0.84

Power Block selection includes both high-side and low-side FETs. Discrete selection requires a high-side FET selection and a low-side FET selection. To select a particular device, go to the *Select* column and click the circle next to the desired device. Then, click the red *Submit* button above the *Power Block* list.

Power Block example:



Submit Plots Reset Back to MOSFET Selection

NexFET™ Power Blocks

Select	Part Number	Power Block	Package	Type	Rdson(mΩ)	Vds(V)	Vgs(V)	M1.PTotal(W)	Part Number	Rdson(mΩ)	Vds(V)	Vgs(V)	M2.PTotal(W)	PTotal(W)	Approx.Price($) | 1ku
○	[illegible]	Y	SON5x6	N	6.56	25	10	0.70	CSD86350Q5D	2.58	25	10.00	0.81	1.65	1.04
○	CSD87351Q5D	Y	SON5x6	N	8.80	30	10	0.83	CSD87351Q5D	3.10	30	10.00	0.84	1.67	0.87
○	CSD87350Q5D	Y	SON5x6	N	6.80	30	10	0.79	CSD87350Q5D	2.80	30	10.00	0.88	1.67	1.04
◉	CSD87353Q5D	Y	SON5x6	N	3.40	30	10	0.81	CSD87353Q5D	2.60	30	10.00	0.87	1.67	1.18
○	CSD87351ZQ5D	Y	SON5x6	N	8.80	30	10	0.84	CSD87351ZQ5D	3.10	30	10.00	0.84	1.68	0.87
○	CSD86360Q5D	Y	SON5x6	N	4.50	25	10	0.77	CSD86360Q5D	1.90	25	10.00	0.92	1.68	1.18
○	[illegible]	Y	SON3x3	N	8.10	30	10	0.81	CSD87335Q3D	3.90	30	10.00	0.95	1.76	0.75
○	CSD87352Q5D	Y	SON5x6	N	10.80	30	10	0.90	CSD87352Q5D	4.80	30	10.00	0.90	1.80	0.72
○	CSD87355Q5D	Y	SON5x6	N	4.70	30	10	0.74	CSD87355Q5D	1.80	30	10.00	1.08	1.82	1.04

M1 Highside FETs

Select	Part Number	Package	Type	Rdson (mΩ)	Vds (V)	Vgs (V)	M1.PTotal(W)	Approx. Price($)|1ku
○	CSD17575Q3	SON5X6	N	4.16	30	20.0	1.31	0.44
○	CSD16327Q3	SON3X3	N	5.41	25	10.0	0.81	0.44
○	CSD16322Q5C	SON5X6	N	5.70	25	10.0	0.84	0.50
○	CSD16322Q5	SON5X6	N	5.70	25	10.0	0.84	0.46
○	CSD16323Q3	SON3X3	N	6.12	25	10.0	0.84	0.44
○	CSD16340Q3	SON3X3	N	5.40	25	10.0	0.85	0.44
○	CSD17309Q3	SON3X3	N	6.43	30	10.0	0.92	0.44
○	CSD16409Q3	SON3X3	N	8.43	25	16.0	0.95	0.37
○	CSD16321Q5C	SON5X6	N	2.99	25	10.0	0.95	0.84

M2 Lowside FETs

Select	Part Number	Package	Rdson (mΩ)	Vds (V)	Vgs (V)	M2.PTotal (W)	Approx. Price($)|1ku
○	CSD17573Q5B	SON5x6	2.26	30.0	20.0	0.92	0.75
○	CSD16340Q3	SON3X3	5.40	25.0	10.0	0.93	0.44
○	CSD17576Q5B	SON5X6	4.87	30.0	20.0	0.94	0.55
○	CSD16321Q5C	SON5X6	3.70	25.0	10.0	0.94	0.84
○	CSD16321Q5	SON5X6	3.70	25.0	10.0	0.94	0.73
○	CSD17575Q3	SON5X6	5.12	30.0	20.0	0.95	0.44
○	CSD17303Q5	SON5X6	2.69	30.0	10.0	0.96	0.73
○	CSD16323Q3C	SON3X3	6.12	25.0	10.0	1.00	0.48
○	CSD16414Q5	SON5X6	3.56	25.0	16.0	1.01	0.84

After submission, the *MOSFET Power Loss Calculator* provides power loss information for the selected device in the upper left corner of the window.

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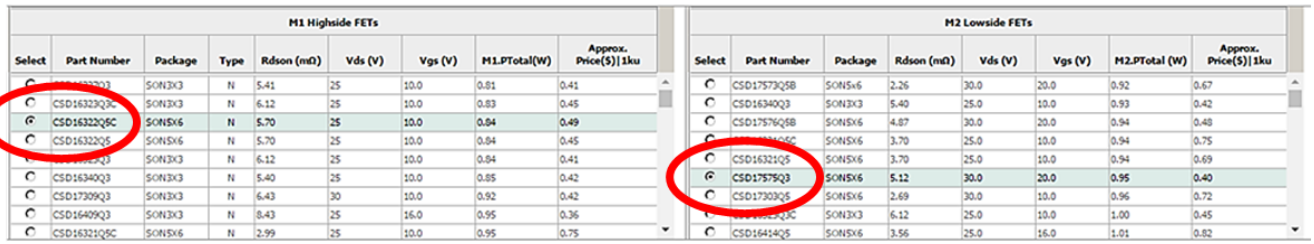
Operating Values		
Duty Cycle	44.118	%
Inductor Ripple	3.125	A
Iout	12.0	A
Power Block:	Y	
Selected M1	CSD87353Q5D	
M1 Power Dissipation	0.80677	W
Selected M2	CSD87353Q5D	
M2 Power Dissipation	0.86545	W
Total Power Dissipation	1.6722	W

Discrete pair example:

When choosing a pair of discretes, select one **M1 Highside FET** and one **M2 Lowside FET**. Click *Submit*.



M1 Highside FETs

Select	Part Number	Package	Type	Rdson (mΩ)	Vds (V)	Vgs (V)	M1.PTotal(W)	Approx. Price($)|1ku
○	[illegible]	SON3X3	N	5.41	25	10.0	0.81	0.41
○	CSD16323Q3C	SON3X3	N	6.12	25	10.0	0.83	0.45
◉	CSD16322Q5C	SONSX6	N	5.70	25	10.0	0.84	0.49
○	CSD16322Q5	SONSX6	N	5.70	25	10.0	0.84	0.45
○	[illegible]	SON3X3	N	6.12	25	10.0	0.84	0.41
○	CSD16340Q3	SON3X3	N	5.40	25	10.0	0.85	0.42
○	CSD17309Q3	SON3X3	N	6.43	30	10.0	0.92	0.42
○	CSD16409Q3	SON3X3	N	8.43	25	16.0	0.95	0.36
○	CSD16321Q5C	SONSX6	N	2.99	25	10.0	0.95	0.75

M2 Lowside FETs

Select	Part Number	Package	Rdson (mΩ)	Vds (V)	Vgs (V)	M2.PTotal (W)	Approx. Price($)|1ku
○	CSD17573Q5B	SONSx6	2.26	30.0	20.0	0.92	0.67
○	CSD16340Q3	SON3X3	5.40	25.0	10.0	0.93	0.42
○	CSD17576Q5B	SONSX6	4.87	30.0	20.0	0.94	0.48
○	[illegible]	SONSX6	3.70	25.0	10.0	0.94	0.75
○	CSD16321Q5	SONSX6	3.70	25.0	10.0	0.94	0.69
◉	CSD17575Q3	SON3X3	5.12	30.0	20.0	0.95	0.40
○	CSD17303Q5	SONSX6	2.69	30.0	10.0	0.96	0.72
○	[illegible]	SON3X3	6.12	25.0	10.0	1.00	0.45
○	CSD16414Q5	SONSX6	3.56	25.0	16.0	1.01	0.82

After submission, refer to the upper left of the window for power loss information.

Operating Values		
Duty Cycle	44.118	%
Inductor Ripple	3.125	A
Iout	12.0	A
Power Block:	N	
Selected M1	CSD16322Q5C	
M1 Power Dissipation	0.8177	W
Selected M2	CSD17575Q3	
M2 Power Dissipation	0.95079	W
Total Power Dissipation	1.7685	W

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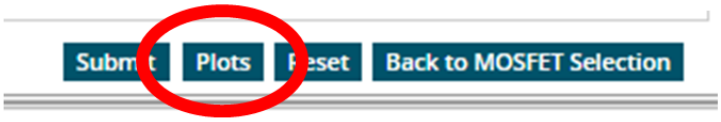
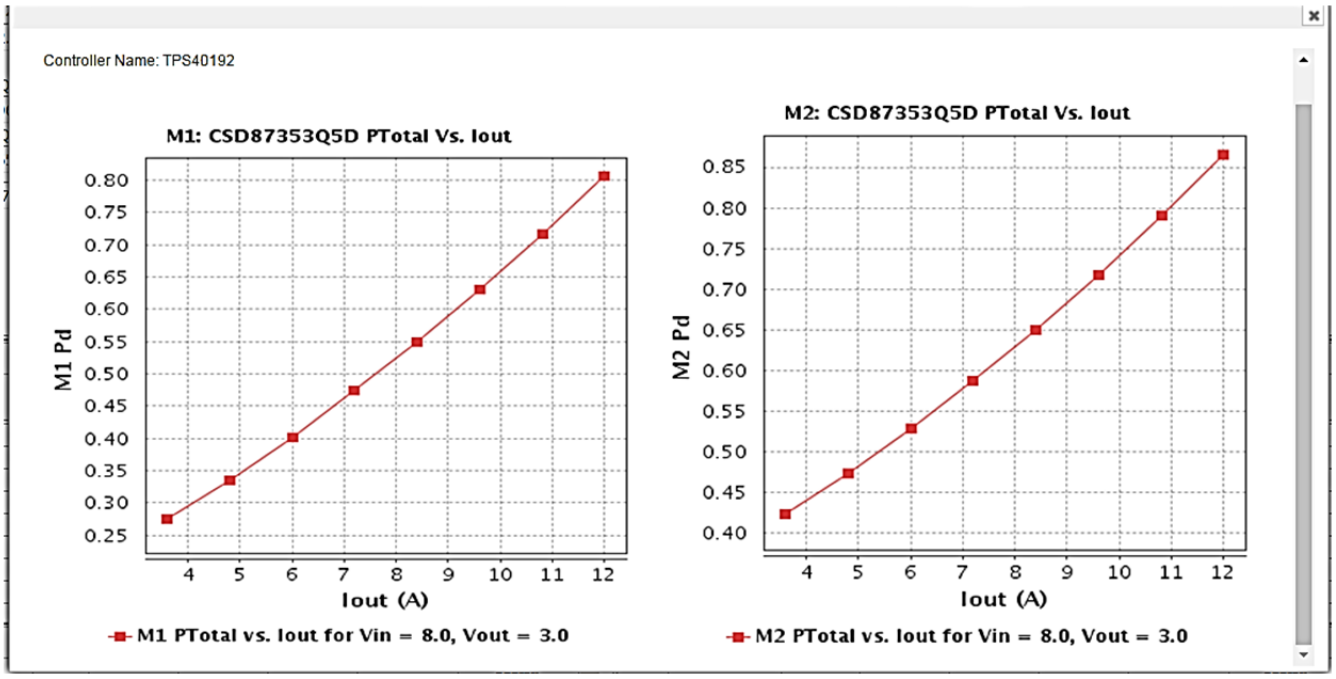
5. **Click *Plots* to generate power loss curves.**

Clicking the *Plots* button, which is located next to the *Submit* button, generates Power Loss vs. Output Current curves.





Step 3. **Click *Reset* to return to the default settings.**

Clicking the *Reset* button returns the circuit to contain its original, default controller and parameter values.

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from A Revision (August 2016) to B Revision	Page
• Changed IE requirement to IE 8.	1

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