

myPower online Design Center

MOSFET Selector & losses calculator



<http://mypower.irf.com>

Prepared by:




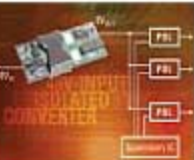


Dan Barsell

Design Services Applications Engineer

Home page & login:

POWER TO LEAD

Welcome to MyPower
International Rectifier's premier site for power

Power Factor Correction  PDF Guided Tour (413KB) Simple circuit design Calculate all part values Reduce PCB space 50% Design a PFC Circuit	Synchronous Rectifier  PDF Guide Improve efficiency Compare MOSFETs Calculate efficiency and Tj Design a Synchronous Rectifier
Point of Load  PDF Guided Tour 1.1MB Simulate iPower circuits Compare discrete MOSFETs Calculate efficiency and Tj Design a POL Circuit	Bus Converter  PDF Guided Tour 433KB Multiple MOSFETs Compare MOSFETs Calculate efficiency and Tj Design a Bus Converter
Motion Control  PDF Guided Tour 568KB Analyze performance Compare IGBT modules Calculate efficiency and Tj Evaluate & Compare IPMs	Lighting  PDF Guide Create a lighting design Display power and efficiency AC or DC Download

**Click on any image to log in.
Login protects your saved designs.
Enter email address and password here.
Or register free by clicking here.**

You must first login or register to access this resource.

New Visitors Register Here.
You will receive quick and easy access to:

- Convenient On-line Ordering.
- Enhanced pricing and availability information.
- IR's design tools.
- Easy access to literature and CD-ROM's.
- Sign-up to receive the latest product information, new product announcements, special offers and more.
- IR Learning Center.
- Seamless access to all areas of WWW.IRF.COM.

REGISTER

To access this site, you must have your browser set to accept temporary cookies. If you need help enabling cookies, [click here](#).

Login Here

Email:
(e.g. johndoe@company.com)

Password:

SUBMIT

Forgot your password? [Click here](#)

APPLICATIONS

AC-DC	DC-DC
Appliances	Die Products
Audio	Hi-Rel
Automotive	Lighting
	Motion Control

COMPANY INFO

- Careers
- Investor Relations
- Press Room
- Environmental
- Tradeshows
- Webcasts
- Contact Us
- E-Mail News
- Site Index

Point of Load

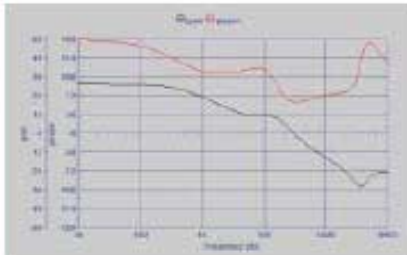
MOSFET Selector tool with Losses Calculator

PDF guided tour (864kb)
 Calculates MOSFET Tj
 Review detailed FET losses
 View passive & active losses
 Compare cost and efficiency
 Calculates optimal Vgs

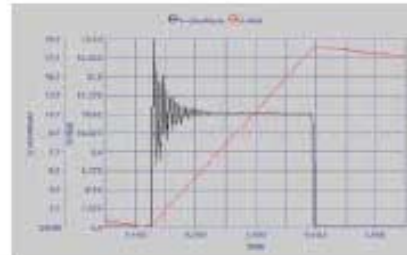
MOSFET Selector Tools	ILoad	Vin	Vout	Frequency	#of Phases
Discrete Sync Buck Converter	1-300A	3.0-21.0V	0.5-0.9V	50-2000kHz	1-10

MOSFET selector tool calculates losses, efficiency and junction temperatures in discrete applications

iPOWIR Sync Buck Simulations



PDF guided tour (864kb)
 Calculates MOSFET Tj
 Review detailed FET losses
 View passive & active losses
 Compare cost and efficiency
 Calculates optimal Vgs



MOSFET Selector Tools	ILoad	Vin	Vout	Frequency	#of Phases
iP1201 Single Output	1-30A	3.14-5.5V	0.8-3.3V	200-400kHz	2
iP1201 Dual Output	1-15A (x2)	3.14-5.5V	0.8-3.3V	200-400kHz	2
iP1202 Single Output	1-30A	5.5-13.2V	0.8-3.3V	200-400kHz	2
iP1202 Dual Output	1-15A (x2)	5.5-13.2V	0.8-3.3V	200-400kHz	2
iP1203 Single Output	1-15A	5.5-13.2V	1.0-3.3V	200-400kHz	1
iP2001 Single Output	20-80A	4.0-14.0V	1.0-1.85V	200-1000kHz	2-4

MOSFET selectors

helps engineers decide which devices to use

POWER TO LEAD

IR International Rectifier

PRODUCT LINE SALES SUPPORT TECHNICAL LIBRARY DESIGN SUPPORT myPOWER

Part Search Site Search

Below is a reference sync buck circuit diagram and corresponding input fields.

Set the input fields to match your application needs, then click the **GO** button.

We will list pairs of HEXFET Power MOSFETs that best meet your needs, including highly accurate calculations of circuit efficiency, device power loss and junction temperature, as well as links to detailed device information.

Enter operating conditions here

Step 1: Select IC: unspecified PWM ?

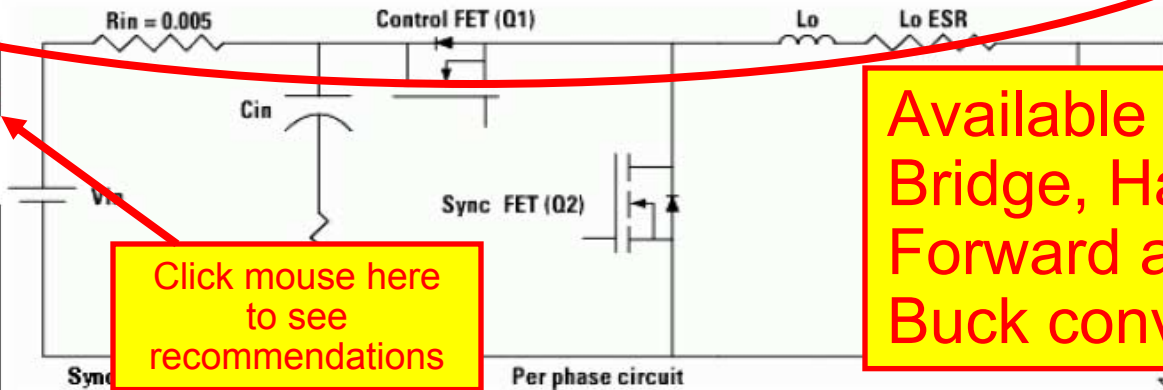
Step 2: Enter Operating Conditions

Circuit Parameters	Passive Elements	Thermal Characteristics
V in: 12 v ?	Inductor: 1 uH ?	Ambient temp: 45 oC ?
V out: 1.3 v ?	Inductor ESR: 1.5 mOhm ?	Max PCB temp: 105 oC ?
Freq: 200 kHz ?	Output Cap: 1000 uF ?	Rth heatsink to ambient: 12 K / W ?
I out max: 60 A ?	Capacitor ESR: 30 mOhm ?	Rth PWB to ambient: 30 K / W ?
Phases: 3 ?	PCB Trace Resistance: 0.01 mOhm ?	Rth case to heatsink: 4 K / W ?
FET gate drive voltage: 5 v ?		
FET gate drive current: 500 mA ?		
control FET's in parallel: 1 ?		
sync FET's in parallel: 1 ?		
Use Buck Diode?: <input type="checkbox"/> ?		

Step 3: See Recommendations GO

Other Options

- RESET
- MOSFET DATA
- LIST
- SAVE DESIGN
- FAQ
- USER GUIDE



Click mouse here to see recommendations

Available for Full Bridge, Half Bridge, Forward and Sync-Buck converters

Results page –

IR International Rectifier

PRODUCT LINE SALES SUPPORT TECHNICAL LIBRARY DESIGN SUPPORT myPOWER

VIEW INPUT FAQ USER GUIDE BACK PRINT PDF

Results can be sorted by rated voltage, rated current, power loss, junction temperature, efficiency, package or price!

We have found **3** pairs of IR HEXFET Power MOSFETs that meet your needs.

Click on any IR part number to view data sheets, spice files, packaging information or av to sort on any parameter. Click on the power loss to see a detailed evaluation of an indiv to start your prototype, use the 'Buy' button to add that pair to your shopping cart.

IR P/N	$B_{V_{dss}}$	I_D @25°C	Power Loss	T_j (°C)	Efficiency	Package	Price*
BUY Q1 IRF6617	30 V	55 A	1.57 W	103	88.4 %	DirectFET	1.34 (x 1)
Q2 IRF6691	20 V	180 A	0.80 W	102		DirectFET	2.29 (x 1)
BUY Q1 IRF6623	20 V	55 A	1.57 W	103	88.4 %	DirectFET	0.76 (x 1)
Q2 IRF6691	20 V	180 A	0.80 W	102		DirectFET	2.29 (x 1)
BUY Q1 IRF6623	20 V	55 A	1.57 W	106	88.1 %	DirectFET	0.76 (x 1)
Q2 IRF6609	20 V	150 A	0.91 W	105		DirectFET	1.66 (x 1)

Details of power losses can be found by clicking here

***note on pricing:**

The price shown is in \$US, per FET, based on MSRP in 1K quantities. The total FET cost will be multiplied by the number of phases you specified (3), as well as the number of devices in parallel that you specified (listed next to the price).

FAQ USER GUIDE BACK PRINT

Here are the Operating Conditions you provided, for reference:

V in: 12 V	FET gate drive voltage: 5 V	Inductor: 1 uH	Ambient temp: 45 oC
V out: 1.3 V	FET gate drive current: 500 mA	Inductor ESR: 1.5 mOhm	Max PCB temp: 105 oC
Freq: 400 kHz	control FET's in parallel: 1	Output Cap: 1000 uF	Rth PWB to ambient: 30 K / W
I out max: 60 A	sync FET's in parallel: 1	Capacitor ESR: 30 mOhm	Rth heatsink to ambient: 10 K / W
Phases: 3	Use Buck Diode?: yes	PCB Trace Resistance: 0.01 mOhm	Rth case to heatsink: 4 K / W

Detailed losses page

POWER TO LEAD

IGOR International Rectifier

PRODUCT LINE SALES SUPPORT TECHNICAL LIBRARY DESIGN SUPPORT **POWER**

Part Search Site Search

SYNC BUCK SELECTOR

PART SET DETAIL

ADD TO CART BACK

VIEW INPUT

Summary: Total Power Losses HELP

Component	Loss (W)	% of Total Power Loss
Control IC	0.291	3.19
Schottky Diode	0.000	0.00
Input Capacitors	0.221	2.42
Input Inductor	0.263	2.88
Output Capacitors	0.321	3.52
Output Inductors	1.816	19.90
Board Trace Impedance Loss	0.036	0.39
Total Control FET Loss	3.254	35.65
Total Sync FET Loss	2.926	32.05
Total Power Loss	9.128	100.00

FET Parameters (typ)

	Control: IRF6623	Sync: IRF6609
# of FETs per phase	1	1
BVdss	20 V	20 V
ID@ 25 °C	55 A	150 A
Vgs	5 V	5 V
RDSon @ Vgs	7.2 mOhm	2.0 mOhm
Qg	11 nC	16 nC
Qgs2	1 nC	5 nC
Qgd	4.0 nC	15.0 nC
Qoss	8.9 nC	26 nC
Qrr	12 nC	26 nC
Body Diode Vf @ 25°C	0.81 V	0.80 V
Package	DirectFET	DirectFET
Price**	\$0.76 (x 1)	\$1.66 (x 1)

Detailed: FET Power Losses Per Phase

Component	Loss (W)	% of Total Power Loss
Control FET: IRF6623		
Conduction Loss*	0.481	5.27
Switching Loss*	0.499	5.47
Output Loss*	0.011	0.12
Sync FET: IRF6609		
Conduction Loss	0.911	9.98
Reverse Rec. Loss*	0.062	0.68
Deadtime Diode Loss	0.064	0.70
Output Loss*	0.031	0.34

* Loss is dissipated in Control FET

Summary: Other Key Parameters

Total Circuit Efficiency	89.52 %
Control FET Tj	102 °C
Sync FET Tj	101 °C
Top Temp	101 °C
Heatsink Temp	97 °C
Peak to Peak Current Ripple	7

****note on pricing:**
The price shown is in \$US, per FET, based on MSRP in 1K quantities. The total FET cost will be multiplied by the number of phases you specified (3), as well as the number of devices in parallel that you specified (listed next to the price).

- MOSFET parameters
- Losses in passives
- Circuit Efficiency
- Junction temperatures
- FET switching losses
- FET conduction losses
- Choose your FET pair and re-calculate!
- Change Input/Output parameters

Re-analyze using your custom FET pair, different operating conditions, or both:
Choose your control FET and sync FET and recalculate losses and temperatures.

control FET: IRF6623 sync FET: IRF6609 GO

Here are the **Operating Conditions** you provided, for reference and reuse: RESET HELP

Circuit Parameters	Passive Elements	Thermal Characteristics
V in: 12 V ?	Inductor: 1 uH ?	Ambient temp: 45 °C ?
V out: 1.3 V ?	Inductor ESR: 1.5 mOhm ?	Max PCB temp: 105 °C ?
Freq: 200 kHz ?	Output Cap: 1000 uF ?	Rth heatsink to ambient: 12 K/W ?
I out max: 60 A ?	Capacitor ESR: 30 mOhm ?	Rth PWM to ambient: 30 K/W ?
Phases: 3 ?	PCB Trace Resistance: 0.01 mOhm ?	Rth case to heatsink: 4 K/W ?
FET gate drive voltage: 5 V ?		
FET gate drive current: 500 mA ?		
control FET's in parallel: 1 ?		
sync FET's in parallel: 1 ?		
Use Buck Diode?: <input type="checkbox"/> ?		