

# myPower online Design Center

Featuring the IR1166 & IR1167A Smart Rectifier



<http://mypower.irf.com/syncrec>

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# Home page & login:

POWER TO LEAD

Welcome to MyPower, International Rectifier's premier site for power design.

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online design

**Flyback Synchronous Rectifier design tool featuring SmartRectifier™**


Access the design center and use the tools to create and optimize your design.

See all the details in a quick [downloadable guided tour](#) (424KB, updated March 2006).

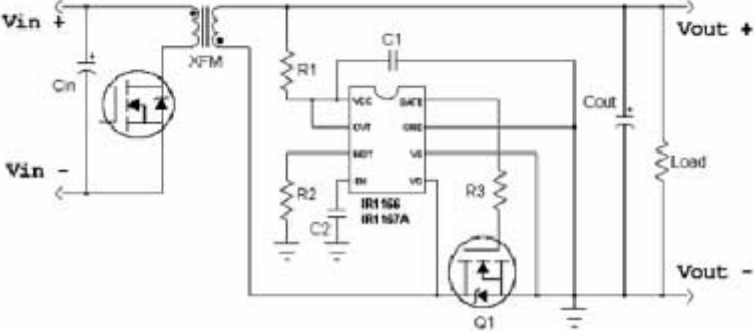
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**Compared to discrete "current transformer" solutions**

- Increases overall system efficiency by 1%
- Reduces the SR PCB area by 50%
- Uses 75% fewer components
- Allows a 20%+ reduction in SR cost
- Allows 'no heatsink' design



**Calculate Values of all components in the Control Circuit**



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| Automotive | Lighting       |
|            | Motion Control |

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# IR1166 & IR1167A

POWER TO LEAD

## Enter Operating Conditions First:

Sync Rec  
Evaluator

**1** Enter Operating  
Conditions

**2** Select  
MOSFET

**3** Circuit Parameters & Bill  
of Material

This design software is for systems with 0.5V-100V output.

Enter application parameters, then click the **GO** button.

We will list synchronous MOSFETs that best meet your needs, and then give you a full bill of materials with circuit performance analysis using the MOSFET you select.

### Step 1: Select the level of information you have about your circuit ?

- Level 1: I know the thermal impedance of my heat sink & the secondary RMS current.
- Level 2: I know the secondary RMS current & I can keep the MOSFET case below a temperature that I pre-set.
- Level 3: I only know the output load current & maximum power dissipation in my application.

### Step 2: Enter Operating Conditions ?

|                |      |   |   |                       |             |     |   |                             |     |    |   |                 |      |      |   |
|----------------|------|---|---|-----------------------|-------------|-----|---|-----------------------------|-----|----|---|-----------------|------|------|---|
| FET Vds        | 100  | v | ? | Switching Freq        | 100         | kHz | ? | Target Start time           | 100 | μs | ? | Heat Sink Rthsa | 10.0 | °C/W | ? |
| Output Voltage | 15.0 | v | ? | Conduction mode       | DCM or CrCM |     | ? | TJ max                      | 105 | °C | ? |                 |      |      |   |
| Bias Voltage   | 15.0 | v | ? | Secondary RMS current | 10          | A   | ? | Minimum Secondary Cond time | 1.5 | μs | ? | Tamb max        | 50   | °C   | ? |

Step 3:  
See Recommendations . **GO**

Other Options

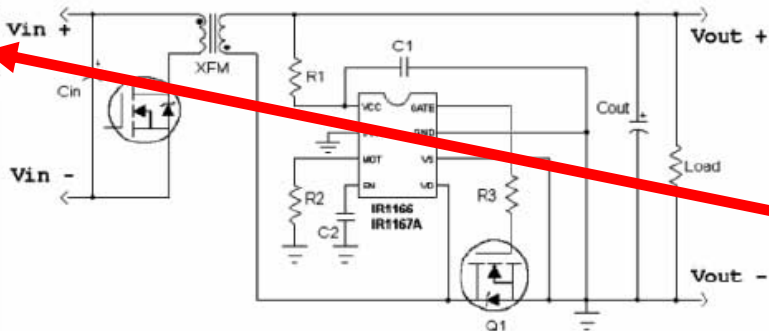
RESET

MOSFET DATA

FAQ

APPLICATION NOTE

USER GUIDE



Enter only the information you know about your circuit and then click on the GO button

# IR1166 & IR1167A

POWER TO LEAD

## Recommendations

SYSTEM CONDITIONS

FAQ

APPLICATION NOTE

USER GUIDE

BACK

PRINT

Sync-Rec evaluator

**1** Enter Operating Conditions

**2** Select MOSFET

**3** Circuit Parameters & Bill of Material

We have found **5** MOSFETs that meet your needs.

Click part number to view data sheets, spice files, packaging information or availability. Click GO to see Circuit Performance and Bill of Materials.

| Click for Circuit Performance & BOM | Part Number<br>▲▼           | Vds<br>▲▼ | Rds(on)<br>10V @<br>25C<br>▲▼ | MOSFET<br>Pd<br>▲▼ | MOSFET<br>Tj<br>▲▼ | Heat Sink<br>Rthsa<br>°C/W | MOSFET<br>qty.<br>▲▼ | Package<br>▲▼ | IC Tj<br>▲▼ | MOSFET<br>Cost<br>▲▼ |
|-------------------------------------|-----------------------------|-----------|-------------------------------|--------------------|--------------------|----------------------------|----------------------|---------------|-------------|----------------------|
|                                     |                             | V         | mΩ                            | W                  | °C                 |                            |                      |               | °C          | \$US                 |
| <b>GO</b>                           | <a href="#">IRFSL4310</a>   | 100       | 7.0                           | 2.762              | 80.4               | 10.0                       | 2                    | TO-262        | 90.3        | 5.78                 |
| <b>GO</b>                           | <a href="#">IRFSL4410</a>   | 100       | 10.0                          | 4.813              | 104.0              | 10.0                       | 2                    | TO-262        | 79.5        | 3.97                 |
| <b>GO</b>                           | <a href="#">IRFB4110PBF</a> | 100       | 4.5                           | 3.920              | 90.8               | 10.0                       | 1                    | TO-220AB      | 71.0        | 3.77                 |
| <b>GO</b>                           | <a href="#">IRFB4310PBF</a> | 100       | 7.0                           | 2.762              | 80.4               | 10.0                       | 2                    | TO-220AB      | 90.3        | 5.72                 |
| <b>GO</b>                           | <a href="#">IRFB4410PBF</a> | 100       | 10.0                          | 4.813              | 104.0              | 10.0                       | 2                    | TO-220AB      | 79.5        | 3.91                 |

\*note on pricing:

The price shown is in \$US, based on MSRP in 1K quantities.

If MOSFETs are used in parallel, the MOSFET cost includes both devices

- List of recommended MOSFETs are presented
- Sorting feature
- Compare parameters
- Select the GO button to view all schematic component values that are matched to that MOSFET

# IR1166 & IR1167A Details

POWER TO LEAD

OBTAIN SAMPLES / DAUGHTERBOARD

BACK

SYSTEM CONDITIONS

PDF

Sync-Rec evaluator

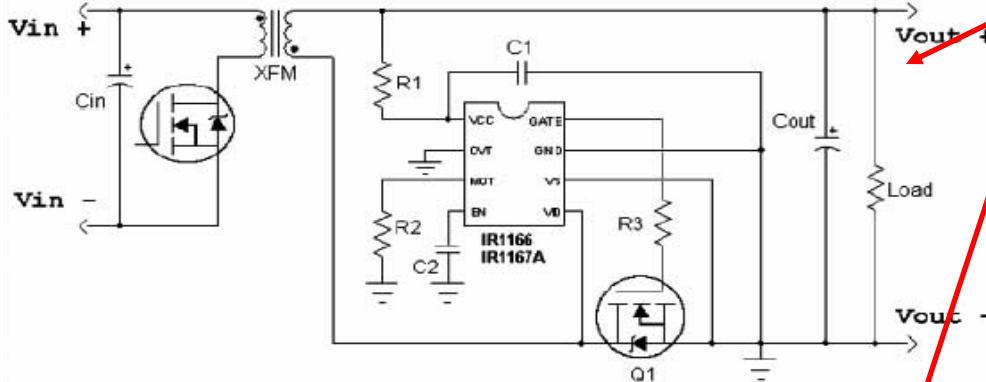
**1** Enter Operating Conditions

**2** Select MOSFET

**3** Circuit Parameters & Bill of Material

| Component             | Ref Des | Value            | Power Dissipation | Calculations                              |
|-----------------------|---------|------------------|-------------------|---|
| Controller            | U1      | IR1166SPBF       | 0.315 W           | 90.3 °C T <sub>J</sub>                    |
| Sync Rec MOSFET       | Q1      | IRFB4310PBF (x2) | 2.762 W           | 80.4 °C MOSFET T <sub>J</sub>             |
| Voltage Drop Resistor | R1      | 39.0 Ω           | 0.026 W           |   |
| MOT Resistor          | R2      | 36.0 kΩ          |                   | 1.44 μs min ON time                       |
| Gate Resistor         | R3      | 1.0 Ω            | 0.107 W           |   |
| Decoupling Capacitor  | C1      | 1.00 μF          | N/A               | 511 mV V <sub>cc</sub> max ripple voltage |
| Start time Capacitor  | C2      | 0.33 nF          | N/A               | 90 μs start time                          |

- Passive components list
- Order Daughterboard/samples
- Calculated junction temps
- Calculated power dissipation
- Calculated ON time
- Calculated start time
- Schematic diagram
- Your Operating conditions



Here are the **Operating Conditions** you provided, for reference:

|                             |                                     |                             |   |
|-----------------------------|-------------------------------------|-----------------------------|---|
| FET V <sub>ds</sub> : 100 V | Switching Freq: 100 kHz             | Target Start time: 100 μs   | Heat Sink R <sub>thsa</sub> : 10.0 °C/W |
| Output Voltage: 15.0 V      | Conduction mode: DCM or CrCM        | T <sub>amb</sub> max: 50 °C | T <sub>J</sub> max: 105 °C              |
| Secondary RMS current: 20 A | Minimum Secondary Cond time: 1.5 μs |                             |   |



Daughterboard