

# **Power MOSFETS for DC/DC Applications**

**Vishay Siliconix**

2201 Laurelwood Road

P.O. Box 54951

Santa Clara, CA 95056

Phone: +1 408 988 8000

Fax: +1 408 567 8950

**[www.vishay.com](http://www.vishay.com)**

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## Introduction

### DC-to-DC MOSFET Specialists

Vishay Siliconix power MOSFETs combine optimized performance specifications with miniaturized packaging to meet the demands of dc-to-dc conversion circuitry in desktop and notebook computers, PDAs, servers, routers, networks, and automobiles. For example, as CPU speeds and power demands rise, our combination of advanced TrenchFET and PWM-optimized process technologies with innovative new packages provide:

- lowest on-resistance for minimum power dissipation
- lowest gate charge for minimum switching losses
- dV/dt shoot-thru immunity
- improved thermal management with higher current capability

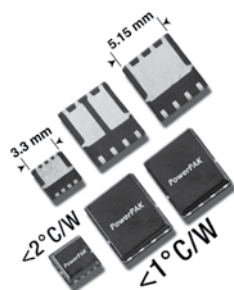
The result is high efficiency solutions, one such example is illustrated in the Synchronous Buck DC-to-DC Converter Efficiency Diagram shown below. These and other power conversion applications benefit from the improvements realized from combining our breakthrough technologies with our DC-to-DC focus and experience.

Breakthroughs in thermal management for increasing power density are achieved with packaging such as the PolarPAK (SiE000 Series), PowerPAK® (Si7000 Series), the thermally enhanced D<sup>2</sup>PAK (SUM Series), and PowerPAK ChipFET® (Si5000 Series). The PolarPAK offers double-sided cooling in an SO-8 footprint. The PowerPAK SO-8 offers the thermal resistance of a DPAK in an SO-8 footprint. The PowerPAK 1212-8 is about half the size of a TSSOP-8 while decreasing the thermal resistance by an order of magnitude. PowerPAK ChipFET offers the same power dissipation as an SO-8, but in an 80 % smaller footprint. The SUM Series reduces thermal resistance by 33 % over standard D<sup>2</sup>PAK packaging. ChipFET is 40 % smaller than a TSOP-6 package while offering lower on-resistance and lower thermal resistance. Lower thermal resistance results in higher possible maximum current and power dissipation.

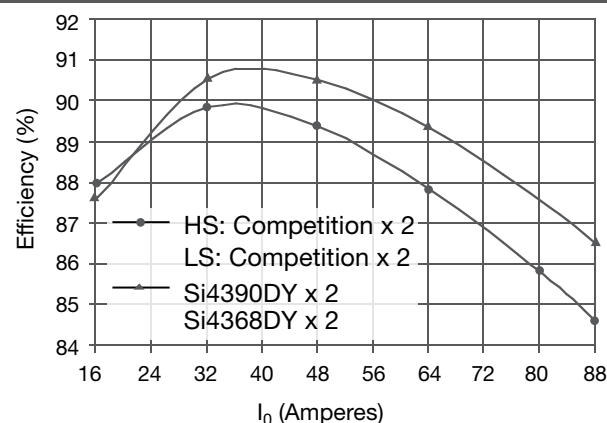
Packaging ranges from the D<sup>2</sup>PAK (SUM or SUB Series), DPAK (SUD Series) and PowerPAK (Si7000 Series) to the LITTLE FOOT® packages, which range from SO-8 (Si4000 Series) down to the tiniest MOSFET available—in SC-89 (Si1000 series) packaging. See page 40 for more on packaging.

To save on valuable board space, LITTLE FOOT Plus integrates a Schottky diode, additional MOSFET and/or logic into the same package as the Vishay Siliconix power MOSFET. See pages 24 and 37 for more information.

Besides saving on board space, Application-specific MOSFETs (ASMs) also save on critical board space while providing higher frequency performance by integrating functions such as drivers in the same package as the power MOSFET. See pages 13 and 14 for more information.



**Synchronous Buck  
DC-to-DC Converter Efficiency**  
Efficiency Comparison 300 kHz ( $V_{IN}$  of 19 V)



**Note:** PowerPAK, MICRO FOOT, ChipFET and LITTLE FOOT are registered trademarks of Siliconix incorporated.



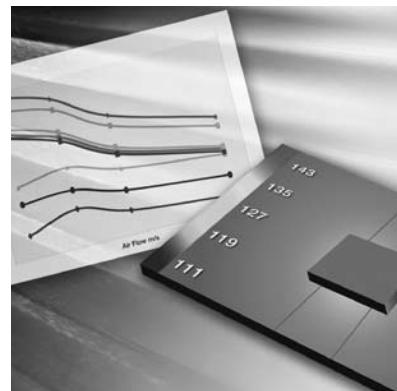
### New ThermoSim™ is First On-Line Thermal Simulation Tool to Use Finite Element Analysis Models for Increased Accuracy

Visit <http://www.vishay.com/thermal-modelling>

- Available on <http://www.vishay.com/thermal-modelling> with exhaustive library of Vishay Siliconix MOSFET models
- Can include effects of other heat dissipating components
- Allows user to configure:
  - Power dissipation profiles
  - Heat sink size, material, and attachment method
  - PCB size, layers, material, copper spreading, vias, etc.
  - Component placements and solder quality
  - System temperature and air flow
- Simulation results are emailed directly to the designer and can be downloaded into Excel.

Vishay's new ThermoSim™ is a free tool that helps designers speed time to market by allowing detailed thermal simulations of Vishay Siliconix power MOSFETs to be performed before prototyping. Applicable to any power MOSFET application, ThermoSim will be especially useful in high-current, high-temperature applications such as fixed telecom, desktop and laptop computers.

Simulation results are emailed directly to the designer and can be downloaded into Excel. Multiple results with varying product, package, or other input data can be merged within Excel to compare and examine trends. Thermal images are provided, and a MPEG video clip of the thermal image with transient simulation is also available. Simulations can be saved for modifications at a later date.

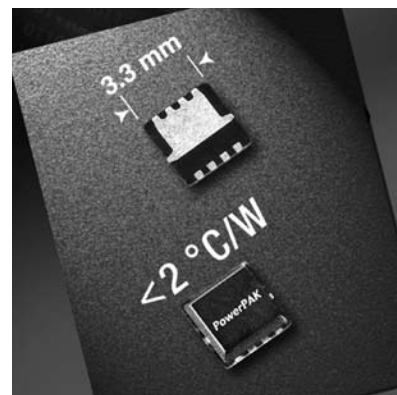


### PowerPAK 1212-8's Nearly 1/3 Size of an SO-8 Footprint Saves Critical Space While Enhancing Thermal Performance

Visit <http://www.vishay.com/mosfets/power-pak-list> for the most updated list of devices

- 10 mm<sup>2</sup> footprint area is 65 % smaller than the SO-8 footprint while providing superior thermal performance and similar electrical performance
  - PowerPAK's advanced thermal design lowers thermal resistance down to <2 °C/W, 88 % lower than SO-8's 16 °C/W
- 1.07 mm profile
- The portfolio includes 12- to 250-V N-channel and 12- to 60-V P-channel voltage ratings, single and dual configuration power MOSFETs
- For dc-to-dc power conversion in computer, fixed telecom and portable applications

With PowerPAK, Vishay Siliconix was the first company to introduce a small-outline, thermally efficient package for power MOSFETs. The PowerPAK SO-8 allows designers to replace DPAK MOSFETs in half the size (32 mm<sup>2</sup> versus 70 mm<sup>2</sup>) and half as thin (1.2 mm versus 2.4 mm) with similar thermal resistance. The PowerPAK 1212-8 enables SO-8 designs to be replaced in 1/3 the space with no penalty, continuing to keep size and heat down as power demands increase, changing the guard in state of the art power conversion design. The extensive PowerPAK family of devices are denoted by part numbers beginning with the Si7xxx prefix.

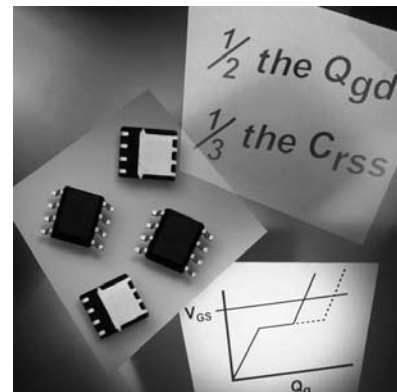


## Power MOSFETs Combining WFET® and TrenchFET® Gen II Technologies Deliver Exceptionally Low Gate Charge and On-Resistance Values for DC/DC Conversion

Visit <http://www.vishay.com/mosfets/wfet> for the most updated list of devices

Visit <http://www.vishay.com/mosfets/trenchfet-2> for the most updated list of devices

- Offer very low on-resistance-times-gate charge figure of merit
- Designed for low-side operation in synchronous buck (single- and multi-phase configurations) dc-to-dc converters
- Provide an exceptionally low gate charge ratio to ensure “shoot-thru” immunity
- Available in PowerPAK SO-8, standard SO-8, and PolarPAK packages



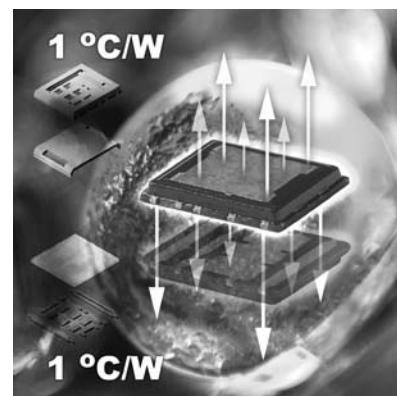
Vishay’s innovative WFET technology uses a thicker gate oxide at the bottom of the devices’ silicon trench to reduce capacitance and gate charge with minimal impact on on-resistance performance, boosting the efficiency of dc-to-dc converters. New devices combining WFET with low on-resistance, high-density TrenchFET® Gen II silicon technology deliver exceptionally low switching and conduction losses. By improving dc-to-dc efficiency in notebook PCs, servers, and VRM modules, as well as in synchronous rectification in fixed telecom systems, new WFET TrenchFET Gen II devices enable the design of faster, lighter, smaller, cooler, more efficient, and longer-running products with more robust feature sets.

Devices combining WFET and TrenchFET Gen II include the Si4368DY (SO-8), Si7668ADP (PowerPAK SO-8) and SiE808DF (PolarPAK). See [www.vishay.com/mosfets](http://www.vishay.com/mosfets) for device selection.

## Breakthrough PolarPAK® Package Brings High Reliability to Double-Sided Cooling

Visit <http://www.vishay.com/ref/polarpak-package> for the most updated list of devices

- Dual Thermal Paths
  - Top (1 °C/W) and bottom (1 °C/W) cooling provides dual heat dissipation paths for forced air applications
  - Double the current density (>60 A) of the SO-8 in same footprint area for space and cost savings
- Leadframe-Based Surface-Mount Packaging
  - Easy handling enables high assembly yield
  - Plastic encapsulation provides good die protection and reliability
  - Fixed footprint and pad layout, independent of die size, across range of family



PolarPAK is the first power MOSFET package to combine double-sided cooling with an industry-standard leadframe and plastic encapsulation construction. Easy handling and mounting onto the PCB provides high assembly yields in mass-volume production. With multiple sources available, PolarPAK is well on its way to becoming an industry standard. PolarPAK devices can be identified with the SiExxx prefix.

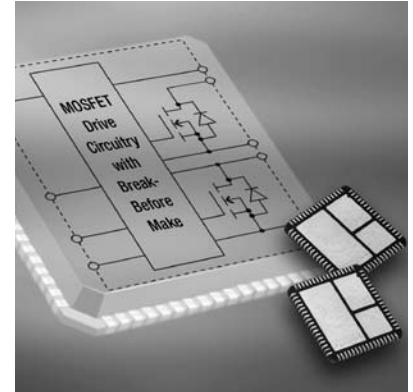
**Note:** WFET, TrenchFET, and PolarPAK are registered trademarks of Siliconix incorporated.



## Fast Switching MOSFETs with Integrated Driver

Visit <http://www.vishay.com/ref/asm> for the latest device listing

- Greater than 96 % efficiency at 500 kHz
- Capable of operating up to 1 MHz
- Handles up to 27 A in PowerPAK MLF packages
- Shoot-thru immune
- Low-side MOSFET control pin for pre-bias start-up
- Scalable to multi-phase applications
- For 12-V, 5-V and 3.3-V input voltage POL applications



These new devices integrate two PWM-optimized MOSFETs and a driver in a single PowerPAK MLF<sup>®</sup> package. Aimed at high-current dc-to-dc converters, the new products reduce stray inductance compared to implementations using three separate components. Careful matching of the MOSFETs and driver helps to minimize converter losses and increase efficiency at higher frequencies. Simple pad geometries streamline the board layout, assembly, and testing processes.

The low-side MOSFET can be individually enabled or disabled. This feature can be used at start-up to block sinking current from a pre-charged output capacitor. The low thermal impedance of the PowerPAK MLF package reduces heat dissipation, helping to improve the reliability of end systems. See page 13 for more details.

**Note:** MLF is a registered trademark of Amkor



## Overview of Website

### How To Use This Selector Guide

This Selector Guide is organized by common dc-to-dc topologies, non-isolated and then isolated. A few critical device specifications are provided and sorted by  $V_{DS}$ ,  $V_{GS}$ ,  $r_{DS(on)}$  at  $V_{GS} = 4.5\text{ V}$  and then package to help narrow down selection. More detailed specifications are provided for further selection in the Alphanumeric Index section, starting on page 41. All figures are maximum values, except gate resistance and gate charge figures, which are typical.

A brief outline of Vishay's Siliconix PWM controllers and converters is provided on page 57. These controllers combined with the Vishay range of MOSFETs provide accurate and very efficient dc-to-dc converters. Vishay's expansive offering also includes PWM controllers, resistors, inductors, capacitors, rectifiers and Schottky diodes.

Although this Selector Guide is a convenient way to view the entire Vishay Siliconix Power MOSFET portfolio, we highly recommend that you visit our website, that is refreshed at least weekly, for the most up to date information. Additionally, the power of the web allows us to enhance your selection and design-in process. Besides being able to click on the function, key specifications and size of MOSFET that you are looking for, there is also a parametric search engine. Either will give you a list of possible datasheets integrated with a table of key specifications. From here you can click on any of the datasheets and "bundle" it with the related documents and drawings that you will need such as package, tape and reel and pad drawings, SPICE models, reliability information, and part marking.

Other web information includes application notes, a list of technical papers, and Selector Guides. Further, samples can be ordered and technical questions can be asked through the website.

Please take the time to review our web features over the next few pages, and visit <http://www.vishay.com/mosfets>.





## Check out <http://www.vishay.com/mosfets>

- New features
- More content
- Refreshed weekly

The screenshot shows the Vishay Siliconix MOSFET website. The main navigation bar includes 'Products A-Z', 'MOSFETs', and 'Siliconix'. A search bar is located in the top right. The main content area is divided into several sections:

- Selectors and datasheets for latest products:** A callout box points to a section titled '1/3 the  $C_{rss}$  and 1/2 the  $Q_{gd}$  while maintaining low  $r_{DS(on)}$ '. It lists three bullet points: 'Record-breaking  $r_{DS(on)} \cdot Q_{gd}$  figures of merit (FOM) to improve dc-to-dc converter efficiency', 'High-side MOSFET benefit: reduces  $C_{rss}$  and  $Q_{gd}$  with no impact on  $r_{DS(on)}$ ', and 'Low-side MOSFET benefit: low  $Q_{gd}/Q_{gs}$  ratio ensures higher shoot-thru immunity'. A graph shows  $V_{DS}$  vs  $Q_{gd}$  with a line labeled '1/2 the  $Q_{GD}$ '.
- Parametric Search:** A callout box points to a section titled 'On-line datasheet search engine by user-customized parameters'. It includes a link to 'Start a customized parametric search or find a datasheet by using the links below.'
- Online Selector Guide:** A callout box points to a section titled 'Online Selector Guide'. It lists various MOSFET packages and their counts: MICRO FOOT® (17), SC-89 (16), SC-75A (6), SC-70 (50), SOT-23 (39), TSOP-5 and TSOP-6 (69), 1206-8 ChipFET® (37), PowerPAK ChipFET (19), PowerPAK SO-8 (108), PolarPAK® (4), PowerPAK MLF (2), SO-16 (7), TO-92S (2), TO-92 (13), DPAK (TO-252) (55), Reverse DPAK (TO-252) (10), TO-251 (13), D<sup>2</sup>PAK (TO-263) (81), TO-220 (39), SOT-23 and smaller (122), SOT-23 to TSSOP-8 (260), PowerPAK 1212-8 to PowerPAK SO-8 (448), and PowerPAK SO-8 and larger (276).
- Related drawings and documents:** A callout box points to a section titled 'Related drawings and documents'. It lists 'Related Documents (4375):' including Application Note (6), Markings (16), Package Drawing (28), Pad Guidelines (33), RC Thermal Models (191), Real Info (1), Reliability Data (41), Support Tools (2), Tape Info (40), Technical Note (139), and SPICE (3878). It also lists 'Related Documents (4375):' including Application Note (6), Markings (16), Package Drawing (28), Pad Guidelines (33), RC Thermal Models (191), Real Info (1), Reliability Data (41), Support Tools (2), Tape Info (40), Technical Note (139), and SPICE (3878).
- Additional Selectors and datasheets for latest products:** A callout box points to a section titled 'Additional Selectors and datasheets for latest products'.

The footer includes 'Products A-Z', 'Company Info: Press · Investors · Contacts · More...', 'Privacy & Legal · Your Account', and a search bar with 'ALL PRODUCTS' and a 'go' button.



## Sample Datasheet List

One of the world's largest manufacturers of discrete semiconductors and passive components

VISHAY PRODUCTS COMPANY INFO

Products A-Z » MOSFETs » SOT-23 and smaller packages » **Advanced TrenchFET® P-Channels** (15 datasheets)

**Product Support**  
 Contact information for:  
 Distributors  
 Sales Representatives  
 Sales Offices

**Related Information**  
**Related documents (78):**  
 Markings (3)  
 Package Drawing (2)  
 Pad Guidelines (5)  
 Reel Info (1)  
 Reliability Data (4)  
 Tape Info (4)  
 Technical Note (4)  
 SPICE (55)  
**Press releases**

MOSFETs - SOT-23 and smaller packages - Advanced TrenchFET® P-Channels

Part number	Package	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> @ 10 V (Ohms)	r <sub>DS(on)</sub> @ 4.5 V (Ohms)	r <sub>DS(on)</sub> @ 2.5 V (Ohms)	r <sub>DS(on)</sub> @ 1.8 V (Ohms)	Q <sub>g</sub> @ 10 V (nC)	Q <sub>g</sub> @ 4.5 V (nC)	Q <sub>gs</sub> (nC)	Q <sub>gd</sub> (nC)	I <sub>D</sub> Max. (A)
Si8407DB	MICRO FOOT	-20	8		0.027	0.032	0.045		32	3.6	8.5	8.2
Si8411DB	MICRO FOOT	-20	12		0.054	0.075			14	1.7	5.1	5.9
Si1433DH	SC70-6	-30	20	0.15				6	3.1	1	1.6	2.2
Si1431DH	SC70-6	-30	20	0.2				4.3	2.4	0.8	1.3	2
Si2319DS	SOT-23	-40	20	0.082				11.3	6	1.7	3.3	3
Si2343DS	SOT-23	-30	20	0.053	0.086			14	7	1.9	3.7	4
Si2341DS	SOT-23	-30	20	0.072	0.12			9.5	5	1.5	2.5	2.8
Si2307BDS	SOT-23	-30	20	0.078	0.13			9	4.5	1.4	2.4	3.2
Si2303BDS	SOT-23	-30	20	0.2	0.38			4.3	2.3	0.8	1.3	1.4
Si2323DS	SOT-23	-20	8		0.039	0.052	0.068		12.5	1.7	3.3	4.7
Si2321DS	SOT-23	-20	8						8	1.2	2.2	3.3
Si2301BDS	SOT-23	-20	8						4.5	0.7	1.1	2.4
Si2333DS	SOT-23	-20	8						11.5	1.5	3.2	5.3
Si2331DS	SOT-23	-12	8		0.048	0.062	0.09		9	1.3	2.5	3.6
Si2315BDS	SOT-23	-12	8		0.05	0.065	0.1		8	1.1	2.3	3.85

Click a column heading to sort the table.

**Key parameters help you choose which datasheet to click on**

**i button gives you option of "bundling" the datasheet with related documents into one pdf. Menus also available while hovering over i button.**

Products A-Z  
 Company Info: Press · Investors · Contacts · More...  
 Privacy & Legal · Your Account

ALL PRODUCTS go



## Example of Parametric Search

One of the world's largest manufacturers of discrete semiconductors and passive components

VISHAY PRODUCTS COMPANY INFO

Products A-Z » MOSFETs » SOT-23 and smaller packages » Parametric Search Setup » Search

Specify values to narrow results at right

**Results**

10 products:

- SI3473DY
- SI4416DY
- SI4429EDY
- SI4431BDY
- SI4433DY
- SI4842DY
- SI4862DY
- SI9934DY
- SUM60N06-07C
- SUM70N03-09CP

compare results »

**1. Select desired parameters**

**2. Go to list of datasheets with key specification table**

**$Q_g$  Typ.**  
To select multiple values, Ctrl-click or click-drag  
25  
40  
40.5  
71  
90  
170  
172  
Reset

**$V_{DS}$**   
To select multiple values, Ctrl-click or click-drag  
30  
20  
40  
Reset

**$Q_g @ 4.5 V$**   
To select multiple values, Ctrl-click or click-drag  
25  
35  
37  
40  
40.5  
50  
80  
Reset

**Channel**  
To select multiple values, Ctrl-click or click-drag  
N  
Reset

**$Q_g @ 10 V$**   
To select multiple values, Ctrl-click or click-drag  
55  
71  
88  
90  
170  
172  
200  
Reset

**$I_D$  Max.**  
To select multiple values, Ctrl-click or click-drag  
23  
25  
29  
70  
85  
110  
Reset

**$V_{DS} R_{DS(on)}$**   
To select multiple values, Ctrl-click or click-drag  
10  
4.5  
Reset

**$Q_g @ 10 V$**   
To select multiple values, Ctrl-click or click-drag  
20  
Reset

**$r_{DS(on)}$**   
Type a min. or max. value, then press Update  
Minimum:  mOhms  
Maximum:  mOhms  
Update  
Available values  
Lowest:  2.5 mOhms  
Highest:  4.5 mOhms  
Reset

**$P_D$  Max.**  
To select multiple values, Ctrl-click or click-drag  
3.5  
5.4  
88  
120  
166  
242  
375  
Reset

**$Q_{gd}$**   
To select multiple values, Ctrl-click or click-drag  
9.7  
10.5  
16  
22  
30  
Reset

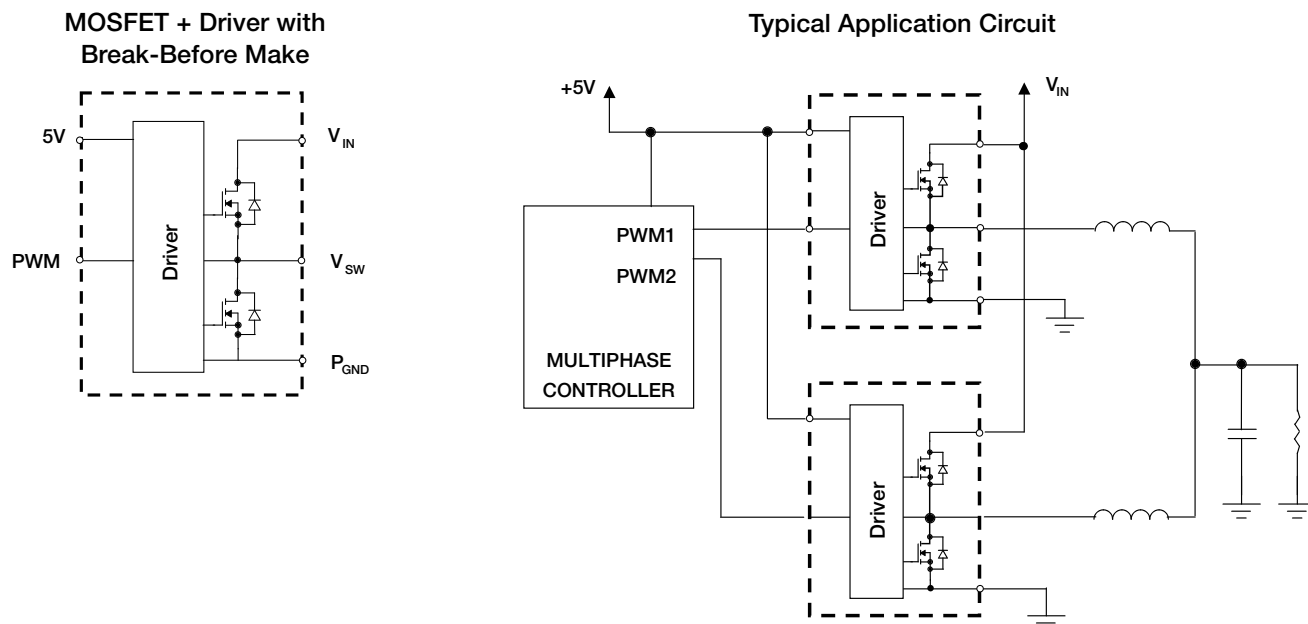
Products A-Z  
Company Info: Press · Investors · Contacts · More...  
Privacy & Legal · Your Account

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## Synchronous Buck

### Application Specific MOSFETs (ASMs)



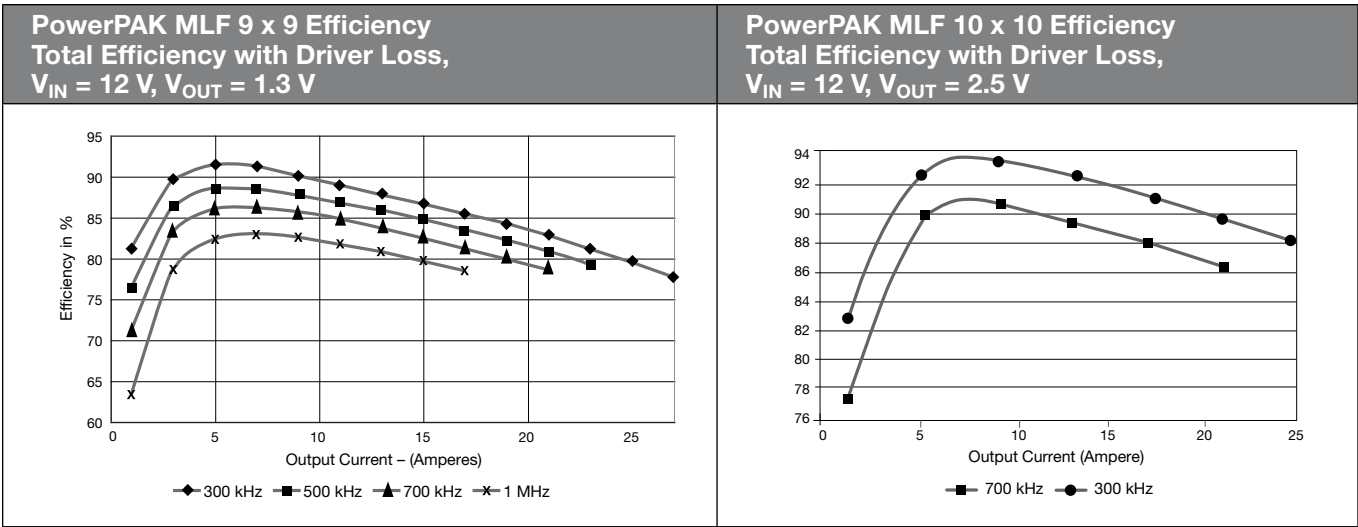
### Package/Duty Ratio Selection

	3.3 V <sub>IN</sub>		5 V <sub>IN</sub>		12 V <sub>IN</sub>		20 V <sub>IN</sub>	
	10 % Duty Ratio	40 % Duty Ratio	10 % Duty Ratio	40 % Duty Ratio	10 % Duty Ratio	40 % Duty Ratio	10 % Duty Ratio	40 % Duty Ratio
PowerPAK MLF 9 x 9	SiC734CD9	SiC730CD9	SiC734CD9	SiC730CD9	SiC734CD9	SiC730CD9	SiC734CD9	SiC730CD9
PowerPAK MLF 10 x 10	SiC714CD10	SiC711CD10	SiC714CD10	SiC711CD10	SiC714CD10	SiC711CD10		

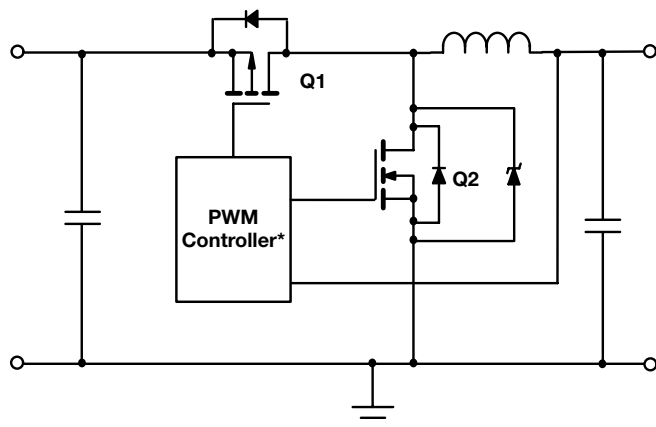
### MOSFETs and Driver Selector

Part Number	V <sub>IN</sub> (V)	r <sub>DS(on)</sub> (Ω)		f <sub>max</sub> (kHz)	I <sub>OUT</sub> (A)	Maximum Efficiency (%)	Low-Side MOSFET Control Pin	Samples
		High-Side	Low-Side					
PowerPAK MLF 10 x 10								
SiC711CD10	3 to 16	0.005	0.0048	1000	25	96.4	Y	Available
SiC714CD10	3 to 20	0.01275	0.0036	1000	27	96	Y	Available
PowerPAK MLF 9 x 9								
SiC730CD9	3 to 20	0.0104	0.00432	1000	22	95	Y	Q406
SiC734CD9	3 to 20	0.0123	0.0044	1000	26	95	Y	Q406

See efficiency diagrams on page 14.



## Design Tips for Synchronous Buck



\* Examples: Si9145, Si9142, Si9168.  
See page 57 for more information.

Gate drive voltage	High-Side	Low-Side
> 5 V	High $V_{th}$	High $V_{th}$
5 V	High $V_{th}$	Low $V_{th}$

Optimized MOSFET parameters for synchronous-buck configuration, including theoretical and SPICE simulations and extensive verification via bench testing, is summarized in these design guidelines.

High-side and low-side MOSFET on-resistance ratios for desktop and notebook core voltage are different and can be summarized as follows:

$V_{IN}$	On-resistance ratio
12	2:1
20	3:1

A single device may not always be used due to current requirements, however this ratio also reflects the effective on-resistance of paralleled devices. Example: In a notebook application, if the high side on-resistance is 21 m $\Omega$ , then the low side on-resistance would be 7 m $\Omega$ . Analysis of gate drive voltage versus MOSFET threshold voltage shows that for notebook applications with a 5-V gate drive, a low threshold voltage device is preferred for frequencies below 500 kHz for the low-side MOSFET. Otherwise, a high threshold device is used for the high-side and high frequency applications. Threshold voltages can be found with more detailed device parameters in the Alphanumeric Index section, starting on page 41.

## High-Side MOSFET Selector (Q1)

The high-side device has a very short duty cycle because the input voltage is much greater than the output voltage ( $V_{IN} = 12\text{ V}$  or  $20\text{ V}$  and  $V_{OUT} = 1.6\text{ V}$  or lower).

- The main component of losses are “switching losses.” In order to reduce them, a MOSFET is required to have:
  - Small  $R_g$  and  $L_g$  (gate inductance) to reduce switching time constant
  - Small  $C_{iss}$  for short current transients
  - Small  $C_{gd}$  for short voltage transients
- Continuing with the lower capacitance values leads to the second issue of reducing gate charge losses. This can be done by selecting a device with small  $C_{iss}$  and  $C_{GS}$ , that effectively requires a device with a small gate charge.
- The final concern is conduction losses. This requires a device with low on-resistance.

Although the first two points are related by gate charge and selecting a device with a very low  $Q_g$  is necessary, the trade off is that a low  $Q_g$  MOSFET will typically result in higher on-resistance. Therefore, the figure of merit typically used for device selection is the product of on-resistance and gate charge,  $r_{DS(on)} \times Q_g$ . Different vendors have different processes, yet for each process the  $r_{DS(on)} \times Q_g$  figure of merit is basically a constant. A head-to-head comparison will show that Vishay’s Siliconix Power MOSFET process has significantly lower  $r_{DS(on)} \times Q_g$  than competitive processes.

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
High-Side MOSFET Selector (Q1)									
Single MOSFETs									
Si7106DN	20	12		0.0062	0.0098		17.5		PowerPAK 1212-8
Si7110DN	20	20	0.0053	0.0078			14		PowerPAK 1212-8
SUD50N02-06P	20	20	0.006	0.0095			19		DPAK (TO-252)
Si7344DP	20	20	0.008	0.012			10		PowerPAK SO-8
SUM40N02-09P	20	20	0.0095	0.017			10.5		D2PAK (TO-263)
SUD50N02-09P	20	20	0.0095	0.017			10.5		DPAK (TO-252)
SUD50N02-11P	20	20	0.011	0.02			9.2		DPAK (TO-252)
Si7348DP	20	20	0.0125	0.02			5.7		PowerPAK SO-8
SUD50N02-12P	20	20	0.012	0.026			7.5		DPAK (TO-252)
SUM40N02-12P	20	20	0.012	0.026			7.5		D2PAK (TO-263)
SUD50N024-09P	22	20	0.0095	0.017			10.5		DPAK (TO-252)
SUR50N024-09P	22	20	0.0095	0.017			10.5		Reverse DPAK
SUR50N025-09BP	25	20	0.0086	0.012		38	18.5		Reverse DPAK
SUU50N025-09BP	25	20	0.0086	0.012		38	18.5		TO-251
SUD50N025-09BP	25	20	0.0086	0.012		38	18.5		DPAK (TO-252)
Si4856ADY	30	20	0.0052	0.0076			21		SO-8
Si7634DP	30	20	0.0052	0.0076		52	21		PowerPAK SO-8





## High-Side MOSFETs (Q1), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single MOSFETs, continued									
Si4856DY	30	20	0.006	0.0085			21		SO-8
SUD50N03-7m3P	30	12	0.0073	0.0087		34	15.7		DPAK (T0-252)
SUU50N03-7m3P	30	12	0.0073	0.0087		34	15.7		T0-251
SUM85N03-06P	30	20	0.006	0.009		48			D2PAK (T0-263)
Si7386DP	30	20	0.007	0.0095			11.5		PowerPAK SO-8
Si4386DY	30	20	0.007	0.0095			11		SO-8
Si4394DY	30	12	0.00825	0.00975			12.5		SO-8
Si7342DP	30	12	0.00825	0.00975			12.5		PowerPAK SO-8
SUP85N03-07P	30	20	0.007	0.01		60			T0-220
SUM85N03-07P	30	20	0.007	0.01			20		D2PAK (T0-263)
SUM85N03-08P	30	20	0.0075	0.0105			13		D2PAK (T0-263)
Si7840BDP	30	20	0.0085	0.0105			14		PowerPAK SO-8
Si7860DP	30	20	0.008	0.011			13		PowerPAK SO-8
Si4860DY	30	20	0.008	0.011			13		SO-8
Si7684DP	30	12	0.009	0.011		30	14		PowerPAK SO-8
SiE800DF	30	20	0.0072	0.0115		23	12		PolarPAK
Si4392ADY	30	20	0.0075	0.0115		25	12		SO-8
Si7392ADP	30	20	0.0075	0.0115		25	12		PowerPAK SO-8
Si4684DY	30	12	0.0094	0.0115		30	14		SO-8
Si7384DP	30	20	0.0085	0.0125			12		PowerPAK SO-8
Si4384DY	30	20	0.0085	0.0125			12		SO-8
Si7860ADP	30	20	0.0095	0.0125			13		PowerPAK SO-8
Si7682DP	30	20	0.009	0.013		24	11		PowerPAK SO-8
SUP70N03-09BP	30	20	0.009	0.013			15.5		T0-220
Si4682DY	30	20	0.0094	0.0135		24	11		SO-8
Si7390DP	30	20	0.0095	0.0135			10		PowerPAK SO-8
Si4390DY	30	20	0.0095	0.0135			10		SO-8
Si7392DP	30	20	0.00975	0.01375			10		PowerPAK SO-8
Si4392DY	30	20	0.00975	0.01375			10		SO-8
SUU50N03-09P	30	20	0.0095	0.014			15		T0-251
SUD50N03-09P	30	20	0.0095	0.014			11		DPAK (T0-252)

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs.  $10\text{ V}$ )
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs.  $4.5\text{ V}$ )
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs.  $3.3\text{ V}$ )
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs.  $3.3\text{ V}$ )

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs.  $4.5\text{ V}$ )
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs.  $2.5\text{ V}$  or  $3.3\text{ V}$ )
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs.  $3.3\text{ V}$ )
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs.  $3.3\text{ V}$ )
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs.  $4.5\text{ V}$ )

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## High-Side MOSFETs, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single MOSFETs, continued									
SUM70N03-09CP	30	20	0.0095	0.014		31			D2PAK (TO-263)
Si4686DY	30	20	0.0095	0.014		17	9.2	b	S0-8
SUR50N03-09P	30	20	0.0095	0.014			11		Reverse DPAK
Si7686DP	30	20	0.0095	0.014		17	9.2	b	PowerPAK S0-8
Si4348DY	30	12	0.0125	0.014			15		S0-8
Si7806ADN	30	20	0.011	0.016			13.2	b	PowerPAK 1212-8
Si4894BDY	30	20	0.011	0.016			13.2	b	S0-8
SUU50N03-12P	30	20	0.012	0.0175		28			TO-251
SUD50N03-12P	30	20	0.012	0.0175			13		DPAK (TO-252)
SUR50N03-12P	30	20	0.012	0.0175			13		Reverse DPAK
Si4354DY	30	12	0.0165	0.0185			7		S0-8
Si4892DY	30	20	0.012	0.02			8.7		S0-8
Si7888DP	30	20	0.012	0.02			8.7		PowerPAK S0-8
Si7806BDN	30	20	0.0145	0.0205		19	8.5		PowerPAK 1212-8
Si5480DU	30	20	0.016	0.022		22.5	11		PowerPAK ChipFET
SUD50N03-16P	30	20	0.016	0.024			8.5		DPAK (TO-252)
SUR50N03-16P	30	20	0.016	0.024			8.5		Reverse DPAK
SUM55N03-16P	30	20	0.016	0.024		17			D2PAK (TO-263)
Si4346DY	30	12	0.023	0.025	0.036		6.5	e	S0-8
Si7804DN	30	20	0.0185	0.03			8.7	b	PowerPAK 1212-8

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs. 4.5 V)

**Low-Side MOSFET Selector (Q2)**

1. Since the duty cycle is very long for the low-side, the conduction losses are the main concern. Here, selecting a MOSFET with a low on-resistance is important.
2. When the low-side turns off and the high-side MOSFET turns on, there is a high  $dV/dt$  occurring at the output node between the two MOSFETs. The  $dV/dt$  can inflect a voltage on the gate of the low-side MOSFET due to the Miller capacitance of the MOSFET structure. If the gate voltage rises sufficiently high enough, the low-side MOSFET can turn back on for a short period of time. This condition has been labeled as “shoot-through”. A lowside MOSFET requires a form of shoot-through ruggedness. The key factor is the  $C_{rss}/C_{iss}$  or  $Q_{gd}/Q_{GS}$  ratio. The ratio required depends on the MOSFET's  $C_{iss}$  and the threshold voltage,  $V_{th}$ . The table below shows a basic guide line requirement of the ratio versus the MOSFET threshold. As expected, the higher the threshold voltage, the higher the  $Q_{gd}/Q_{GS}$  ratio can be.
3. Since the current is already flowing through the output inductor when the high-side is switching, it is important that the switching losses are minimized. Current capability of the MOSFET driver is limited when using only the PWM controller. Thus, as with the high-side device, select a device with small  $C_{iss}$  and  $C_{GS}$ . This effectively requires a device with a small  $r_{DS(on)} * Q_g$  product.
4. The final key factor of losses in the low-side is switching frequency. As the frequency is increased, reduction of  $R_g$ ,  $C_{iss}$ , and  $C_{gd}$  is important.

Device Characteristics		Based on $C_{iss} = 4 \text{ nF}$	
$V_{th}$	$V_{GS}$ max. rating	$C_{rss}/C_{iss} @ V_{DS} = 0 \text{ V}$	$Q_{gd}/Q_{GS}$
1 V to 1.2 V	12 V	< 0.25	< 0.8
1.8 V to 2 V	20 V	< 0.40	< 1.0

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Low-Side MOSFETs												
Single MOSFETs												
Si7862ADP	16	8		0.003	0.0055			54				PowerPAK S0-8
Si4862DY	16	8		0.0033	0.0055			48				S0-8
Si7864ADP	20	8		0.003	0.0042			57				PowerPAK S0-8
SUB85N02-03	20	8		0.003	0.0034	0.0038		140				D2PAK (TO-263)
SUP85N02-03	20	8		0.003	0.0034	0.0038		140				TO-220
Si7866ADP	20	20	0.0024	0.003			83	39				PowerPAK S0-8
Si4864DY	20	8		0.0035	0.0047			47				S0-8
Si4876DY	20	12		0.005	0.0075			55				S0-8

**Notes:**

- $Q_g @ V_{GS} = 15 \text{ V}$  (vs. 10 V)
- $Q_g @ V_{GS} = 5 \text{ V}$  (vs. 4.5 V)
- $r_{DS} = r_{SS}/2$
- $r_{DS(on)} @ V_{GS} = 6 \text{ V}$  (vs. 4.5 V)
- $r_{DS(on)} @ V_{GS} = 3 \text{ V}$  (vs. 3.3 V)
- $r_{DS(on)} @ V_{GS} = 3.7 \text{ V}$  (vs. 3.3 V)

- $r_{DS(on)} @ V_{GS} = 4.75 \text{ V}$  (vs. 4.5 V)
- $r_{DS(on)} @ V_{GS} = 2.7 \text{ V}$  (vs. 2.5 V or 3.3 V)
- Not used
- $r_{DS(on)} @ V_{GS} = 3.1 \text{ V}$  (vs. 3.3 V)
- S1 and D2 connected
- Not used

- Schottky connected to channel 1
- Half-bridge
- Not used
- $r_{DS(on)} @ V_{GS} = 3.6 \text{ V}$  (vs. 3.3 V)
- $Q_g @ V_{GS} = 6 \text{ V}$  (vs. 4.5 V)
- $r_{DS(on)} @ V_{GS} = 8 \text{ V}$  (vs. 4.5 V)

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Low-Side MOSFETs (Q2), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Single MOSFETs, continued												
SUM110N02-03P	20	20	0.0032	0.0052				40				D2PAK (TO-263)
SUD50N02-04P	20	20	0.0043	0.006				40				DPAK (TO-252)
SUM85N02-05P	20	20	0.005	0.0083				19				D2PAK (TO-263)
SUD50N02-06P	20	20	0.006	0.0095				19				DPAK (TO-252)
Si7344DP	20	20	0.008	0.012				10				PowerPAK S0-8
SUM40N02-09P	20	20	0.0095	0.017				10.5				D2PAK (TO-263)
SUD50N024-06P	22	20	0.006	0.0095				19				DPAK (TO-252)
SUR50N024-06P	22	20	0.006	0.0095				19				Reverse DPAK
SUD50N024-09P	22	20	0.0095	0.017				10.5				DPAK (TO-252)
SUR50N024-09P	22	20	0.0095	0.017				10.5				Reverse DPAK
Si4630DY	25	16	0.0027	0.0032			107.5	49				S0-8
Si4632DY	25	16	0.0027	0.0033			108	49				S0-8
SUD50N025-05P	25	20	0.0052	0.0076			63	30				DPAK (TO-252)
SUU50N025-05P	25	20	0.0052	0.0076			63	30				TO-251
SUR50N025-05P	25	20	0.0052	0.0076			63	30				Reverse DPAK
SUD50N025-06P	25	20	0.0062	0.01			44	20.5				DPAK (TO-252)
SUR50N025-06P	25	20	0.0062	0.01			44	20.5				Reverse DPAK
SUU50N025-06P	25	20	0.0062	0.01			44	20.5				TO-251
Si7668ADP	30	12	0.003	0.0034			110	52				PowerPAK S0-8
Si7380ADP	30	12	0.003	0.0035			122	54				PowerPAK S0-8
Si7664DP	30	12	0.0031	0.0036			85	38				PowerPAK S0-8
Si4368DY	30	12	0.0032	0.0036				53				S0-8
Si4304DY	30	12	0.0032	0.0037			79.5	36				S0-8
SUM110N03-03P	30	20	0.0026	0.004			172					D2PAK (TO-263)
Si4320DY	30	20	0.003	0.004				45				S0-8
Si7336ADP	30	20	0.003	0.004				36				PowerPAK S0-8
Si4324DY	30	20	0.0032	0.0042			55.5	25.5				S0-8
Si4336DY	30	20	0.00325	0.0042				36				S0-8
Si7894ADP	30	12	0.0036	0.0045				58				PowerPAK S0-8
Si7674DP	30	20	0.0033	0.0046			60	28				PowerPAK S0-8
Si7856ADP	30	20	0.0037	0.0048				39				PowerPAK S0-8
Si7886ADP	30	12	0.004	0.0048				47				PowerPAK S0-8

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs. 4.5 V)



## Low-Side MOSFETs, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Single MOSFETs, continued												
Si7636DP	30	20	0.004	0.0048				36				PowerPAK SO-8
Si4362BDY	30	12	0.0046	0.0054			75	36				SO-8
Si4406DY	30	20	0.0045	0.0055				34				SO-8
Si4364DY	30	16	0.0045	0.0055				48				SO-8
Si4366DY	30	12	0.0048	0.0055				48				SO-8
Si7358ADP	30	20	0.0042	0.0059				30.5				PowerPAK SO-8
Si7382DP	30	20	0.0047	0.0062				27				PowerPAK SO-8
Si4382DY	30	20	0.0047	0.0062				27				SO-8
SUM110N03-04P	30	20	0.0042	0.0065				40				D2PAK (TO-263)
Si4356ADY	30	12	0.0055	0.0068			69	30				SO-8
SUP85N03-04P	30	20	0.004	0.007			71					TO-220
Si4858DY	30	20	0.00525	0.007				30.5				SO-8
Si7634DP	30	20	0.0052	0.0076			52	21				PowerPAK SO-8
Si4856ADY	30	20	0.0052	0.0076				21				SO-8
SUD50N03-06AP	30	20	0.0057	0.0078			62	30				DPAK (TO-252)
SUR50N03-06AP	30	20	0.0057	0.0078			62	30				Reverse DPAK
SUU50N03-06AP	30	20	0.0057	0.0078			62	30				TO-251
Si7440DP	30	20	0.0065	0.008				29				PowerPAK SO-8
Si4856DY	30	20	0.006	0.0085				21				SO-8
SUM85N03-06P	30	20	0.006	0.009			48					D2PAK (TO-263)
Si7342DP	30	12	0.00825	0.00975				12.5				PowerPAK SO-8
SUP85N03-07P	30	20	0.007	0.01			60					TO-220
SUM85N03-07P	30	20	0.007	0.01				20				D2PAK (TO-263)
Si7446BDP	30	20	0.0075	0.01				22			b	PowerPAK SO-8
SUM85N03-08P	30	20	0.0075	0.0105				13				D2PAK (TO-263)
Si7860DP	30	20	0.008	0.011				13				PowerPAK SO-8
Si4860DY	30	20	0.008	0.011				13				SO-8
Si7860ADP	30	20	0.0095	0.0125				13				PowerPAK SO-8
SUR50N03-09P	30	20	0.0095	0.014				11				Reverse DPAK
SUD50N03-09P	30	20	0.0095	0.014				11				DPAK (TO-252)
SUU50N03-09P	30	20	0.0095	0.014				15				TO-251
Si4820DY	30	20	0.013	0.02				20				SO-8
Si4346DY	30	12	0.023	0.025	0.036			6.5			e	SO-8

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs.  $10\text{ V}$ )
  - b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs.  $4.5\text{ V}$ )
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs.  $3.3\text{ V}$ )
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs.  $3.3\text{ V}$ )

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs.  $4.5\text{ V}$ )
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs.  $2.5\text{ V}$  or  $3.3\text{ V}$ )
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs.  $3.3\text{ V}$ )
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs.  $3.3\text{ V}$ )
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs.  $4.5\text{ V}$ )

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Low-Side MOSFETs, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
LITTLE FOOT <i>Plus</i> Schottky - Single MOSFETs												
Si5858DU	20	8		0.039	0.045	0.055		6	0.375	1		PowerPAK ChipFET
Si7374DP	30	20	0.0055	0.0066			81	38	0.39	1		PowerPAK SO-8
Si4736DY	30	12	0.0095	0.011				37	0.53	3		SO-8
Si4810BDY	30	20	0.0135	0.02				14.5	0.53	3	b	SO-8
Si4812BDY	30	20	0.016	0.021				8.5	0.5	1	b	SO-8
Si4832DY	30	20	0.018	0.028				13	0.53	3		SO-8
Si4300DY	30	20	0.0185	0.033				8.7	0.5	1		SO-8
Si4620DY	30	20	0.035	0.052			8.6	4.2	0.4	2		SO-8

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs.  $10\text{ V}$ )
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs.  $4.5\text{ V}$ )
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs.  $3.3\text{ V}$ )
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs.  $3.3\text{ V}$ )

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs.  $4.5\text{ V}$ )
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs.  $2.5\text{ V}$  or  $3.3\text{ V}$ )
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs.  $3.3\text{ V}$ )
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs.  $3.3\text{ V}$ )
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs.  $4.5\text{ V}$ )



## Synchronous Buck Summary - Best Selection for CPU core and Graphics Applications

To summarize, the old way of thinking that the  $r_{DS(on)} \times Q_g$  figure of merit is the key parameter to MOSFET selection has its merits. However, shoot-through immunity and threshold voltage also play as important factors to MOSFET selection.

The following table contains examples of best selection considering the different MOSFET parameters as described above with the LITTLE FOOT and PowerPAK family. This chart is for <25 % high-side duty cycle applications.

### High-Side

	Low $R_G < 1 \Omega$			Standard $R_G > 1 \Omega$			Package
	$r_{DS(on)} (\Omega)$ max $V_{GS} = 10 V$	$r_{DS(on)} (\Omega)$ max $V_{GS} = 4.5 V$	Part Number	$r_{DS(on)} (\Omega)$ max $V_{GS} = 10 V$	$r_{DS(on)} (\Omega)$ max $V_{GS} = 4.5 V$	Part Number	
20 $V_{GS}$ (max) High $V_{th}$	0.0094	0.0135	Si4682DY	0.0075	0.0115	Si4392ADY	SO-8
	0.009	0.013	Si7682DP	0.0075	0.0115	Si7392ADP	PowerPAK SO-8
12 $V_{GS}$ (max) Low $V_{th}$	0.0094	0.0135	Si4684DY				SO-8
	0.009	0.011	Si7684DP				PowerPAK SO-8

### Low-Side

	Low $Q_g$ , WFET Technology			Standard Technology			Package
	$r_{DS(on)} (\Omega)$ max $V_{GS} =$ 10 V	$r_{DS(on)} (\Omega)$ max $V_{GS} =$ 4.5 V	Part Number	$r_{DS(on)} (\Omega)$ max $V_{GS} =$ 10 V	$r_{DS(on)} (\Omega)$ max $V_{GS} =$ 4.5 V	Part Number	
20 $V_{GS}$ (max) High $V_{th}$	0.0032	0.0042	Si4324DY	0.00325	0.0042	Si4336DY	SO-8
	0.0033	0.0046	Si7674DP	0.003	0.004	Si7336ADP	PowerPAK SO-8
12 $V_{GS}$ (max) Low $V_{th}$	0.0032	0.0037	Si4304DY				SO-8
	0.0031	0.0036	Si7664DP				PowerPAK SO-8



## Duals, LITTLE FOOT *Plus* Schottky, Asymmetric MOSFETs (Q1 and Q2)

To save board space and reduce component count, the dual, asymmetric or complementary devices integrate Q1 and Q2 into the same package. LITTLE FOOT *Plus* Schottky further integrates the low side Schottky diode into the same package as Q1 and Q2.

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)		Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Dual MOSFETs										
Si4944DY	30	20	0.0095	0.016		13.5				S0-8
Si4330DY	30	20	0.0165	0.022		13				S0-8
Si7844DP	30	20	0.022	0.03	13					PowerPAK S0-8
Si4804BDY	30	20	0.022	0.03		7				S0-8
Asymmetric MOSFETs										
Si4350DY	20	20	0.012	0.0175		10				S0-14
	20	20	0.0075	0.01		20				
Si4972DY	30	20	0.0145	0.0195	18.5	8.3				S0-8
	30	20	0.0265	0.036	9.6	4				
Si4974DY	30	20	0.019	0.026		7				S0-8
	30	20	0.035	0.048		3.3				
Si4978DY	30	20	0.023	0.032		5.6			b	S0-8
	30	20	0.02	0.027		7.3			b	
Si4976DY	30	20	0.027	0.034		5.4			b, k	S0-8
	30	20	0.017	0.02		9.2			b, k	
LITTLE FOOT <i>Plus</i> Schottky - Dual MOSFETs										
Si7842DP	30	20	0.022	0.03	13		0.5	1		PowerPAK S0-8
Si4808DY	30	20	0.022	0.03	13		0.5	1		S0-8
Si4830ADY	30	20	0.022	0.03		7	0.5	1	k	S0-8
Si4834BDY	30	20	0.022	0.03		7	0.5	1	m	S0-8
LITTLE FOOT <i>Plus</i> Schottky - Asymmetric MOSFETs										
Si4340DY	20	20	0.012	0.0175		10				S0-14
	20	16	0.01	0.0115		17	0.53	3		
Si4308DY	30	20	0.012	0.018		11.5				S0-14
	30	12	0.01	0.011		40	0.53	1		
Si4816BDY	30	20	0.0185	0.0225		7.8			b, k	S0-8
	30	20	0.0115	0.016		11.6	0.5	1	b, k	

**Notes:**

- a. Q<sub>g</sub> @ V<sub>GS</sub> = 15 V (vs. 10 V)
- b. Q<sub>g</sub> @ V<sub>GS</sub> = 5 V (vs. 4.5 V)
- c. r<sub>DS</sub> = r<sub>SS</sub>/2
- d. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 6 V (vs. 4.5 V)
- e. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3 V (vs. 3.3 V)
- f. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.7 V (vs. 3.3 V)

- g. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 4.75 V (vs. 4.5 V)
- h. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 2.7 V (vs. 2.5 V or 3.3 V)
- i. Not used
- j. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.1 V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.6 V (vs. 3.3 V)
- q. Q<sub>g</sub> @ V<sub>GS</sub> = 6 V (vs. 4.5 V)
- r. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 8 V (vs. 4.5 V)

Duals, LITTLE FOOT *Plus* Schottky, Asymmetric MOSFETs, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)		Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
LITTLE FOOT <i>Plus</i> Schottky - Asymmetric MOSFETs, continued										
Si4814BDY	30	20	0.018	0.023		6.6			k	SO-8
	30	20	0.018	0.022		8.9	0.5	1	k	
Si4376DY	30	20	0.02	0.0275		9				SO-8
	30	12	0.019	0.023		12.5	0.5	1		
Si4818DY	30	20	0.022	0.03		8				SO-8
	30	20	0.0155	0.0205		15	0.5	1		
Si7872DP	30	20	0.022	0.03		7				PowerPAK SO-8
	30	12	0.022	0.028		11.5	0.5	1		
Si4370DY	30	20	0.022	0.03		7				SO-8
	30	12	0.022	0.028		11.5	0.5	1		
Si4914DY	30	20	0.023	0.032		5.6				SO-8
	30	20	0.02	0.027		7.3	0.4	1		

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs.  $10\text{ V}$ )
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs.  $4.5\text{ V}$ )
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs.  $3.3\text{ V}$ )
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs.  $3.3\text{ V}$ )

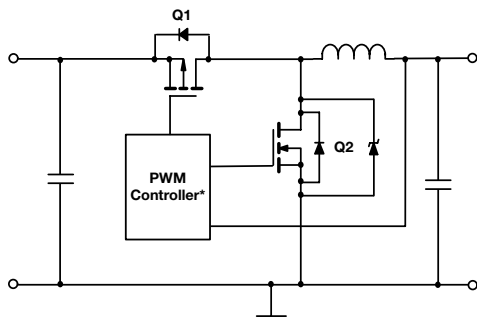
- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs.  $4.5\text{ V}$ )
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs.  $2.5\text{ V}$  or  $3.3\text{ V}$ )
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs.  $3.3\text{ V}$ )
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs.  $3.3\text{ V}$ )
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs.  $4.5\text{ V}$ )

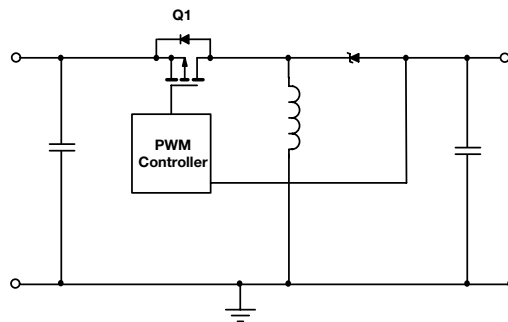
## P-channel MOSFET Selector (Q1) - Synchronous Buck and Voltage Inverter

The losses associated with the high side device result from both  $r_{DS(on)}$  and switching time ( $Q_g$ ). Therefore, a good compromise between  $r_{DS(on)}$  and  $Q_g$  is required for Q1. See pages 13-15 for N-channel selection.

**Synchronous Buck with P-Channel**



**Voltage Inverter**



\* Example: Si9145. See page 57 for more information

### P-channel MOSFETs Synchronous Buck and Voltage Inverter

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Single MOSFETs												
Si2305DS	-8	8		0.052	0.071	0.108		10				SOT-23
Si3869DV	-12	8		0.036	0.05	0.07		20.5				TSOP-6
Si5483DU	-20	12		0.03	0.043		20	9.3				PowerPAK ChipFET
Si3867DV	-20	12		0.051	0.1			7				TSOP-6
Si3443BDV	-20	12		0.06	0.1			6			h	TSOP-6
Si2301BDS	-20	8		0.1	0.15			4.5				SOT-23
Si4433DY	-20	8		0.11	0.16	0.24		5.2				SO-8
Si4835CDY	-30	25	0.017	0.03				22			b	SO-8
LITTLE FOOT Plus Schottky - Single MOSFETs												
Si4873DY	-20	8		0.016	0.021	0.028		40	0.53	3	b	SO-8
Si4621DY	-20	20	0.054	0.094			8.7	4.5				SO-8
Si3871DV	-20	20		0.105	0.175			3.5	0.4	1		TSOP-5
Si4845DY	-20	12		0.21	0.345			2.9	0.5	1		SO-8
Si4837DY	-30	20	0.02	0.03				22	0.53	3		SO-8

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs. 4.5 V)



## P-channel MOSFETs Synchronous Buck and Voltage Inverter, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Complementary MOSFETs												
Si4542DY	30	20	0.025	0.035			30					S0-8
	-30	20	0.032	0.045			32					
Si6544BDQ	30	20	0.032	0.046			9.5					TSSOP-8
	-30	20	0.043	0.073			16					
Si4544DY	30	20	0.035	0.05			18					S0-8
	-30	20	0.045	0.09			19					
Si7501DN	30	20	0.035	0.05			9					PowerPAK 1212-8
	-30	25	0.051				12.5				d	
Si4539ADY	30	20	0.036	0.053			13					S0-8
	-30	20	0.053	0.09			15					

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs.  $10\text{ V}$ )
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs.  $4.5\text{ V}$ )
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs.  $3.3\text{ V}$ )
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs.  $3.3\text{ V}$ )

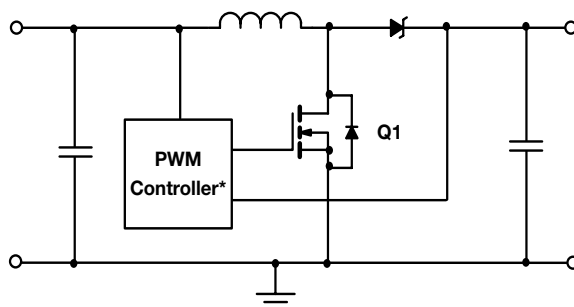
- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs.  $4.5\text{ V}$ )
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs.  $2.5\text{ V}$  or  $3.3\text{ V}$ )
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs.  $3.3\text{ V}$ )
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs.  $3.3\text{ V}$ )
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs.  $4.5\text{ V}$ )

## Non-Synchronous Boost

### N-Channel MOSFET Selector (Q1)

The  $r_{DS(on)}$  is crucial for a long duty cycle, but switching losses are important for low duty cycle. This compromise is important.



\* Examples: Si9145 and Si9165. See page 57 for more information.

### N-Channel MOSFET Selector (Q1)

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single MOSFETs										
Si6466ADQ	20	8		0.014	0.02			18		TSSOP-8
Si4426DY	20	12		0.025	0.035			25		SO-8
Si3460DV	20	8		0.027	0.032	0.038		13.5		TSOP-6
Si3446ADV	20	12		0.037	0.065		13	5.6		TSOP-6
Si6410DQ	30	20	0.014	0.021				22.5		TSSOP-8
Si4412ADY	30	20	0.024	0.035			16			SO-8
Si6434DQ	30	20	0.028	0.042			18			TSSOP-8
Si3456BDV	30	20	0.035	0.052			8.6			TSOP-6
Si2306BDS	30	20	0.047	0.065				3	b	SOT-23
Si3454ADV	30	20	0.06	0.085			9			TSOP-6
Si1302DL	30	20	0.48	0.7			0.86			SC70-3

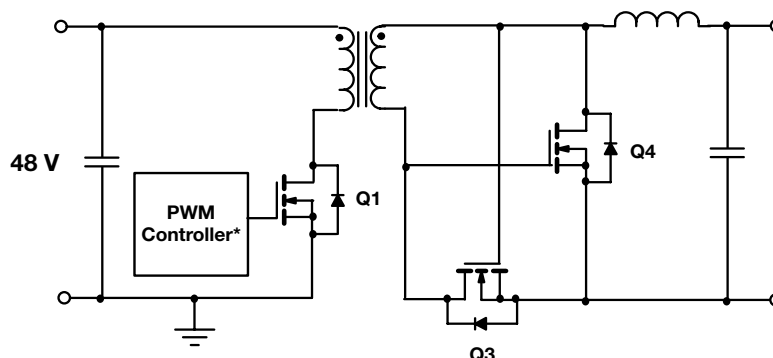
**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Isolated Forward or Flyback Converter



\* Examples: Si280X. See page 57 for more information.

### Single Switch Primary Side MOSFET Selector (Q1)

The primary side of the Forward Converter is the same as the primary side of a Flyback Converter, so the Q1 table below applies to either.

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 6 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	
Single MOSFETs								
SUM34N10-35	100	20	0.035	0.04		35		D2PAK (TO-263)
SUM100N12-14L	125	20	0.0144		0.0154	135	67	D2PAK (TO-263)
Si7606DN	125	20	0.108		0.115	18.5	9.1	PowerPAK 1212-8
SUM85N15-19	150	20	0.019			76		D2PAK (TO-263)
SUP80N15-20L	150	20	0.02		0.022	110		TO-220
SUM40N15-38	150	20	0.038	0.042		38		D2PAK (TO-263)
Si7846DP	150	20	0.05			30		PowerPAK S0-8
Si4488DY	150	20	0.05			30		S0-8
SUP28N15-52	150	20	0.052	0.06		33		TO-220
SUD25N15-52	150	20	0.052	0.06		33		DPAK (TO-252)
SUM23N15-73	150	20	0.073	0.077		22		D2PAK (TO-263)
Si7898DP	150	20	0.085	0.095		17		PowerPAK S0-8
Si4848DY	150	20	0.085	0.095		17		S0-8
SUP18N15-95	150	20	0.095	0.1		20		TO-220
SUU15N15-95	150	20	0.095	0.1		20		TO-251

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Single Switch Primary Side MOSFETs (Q1), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 6 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	
Single MOSFETs, continued								
SUD15N15-95	150	20	0.095	0.1		20		DPAK (TO-252)
Si7818DN	150	20	0.135	0.142		20		PowerPAK 1212-8
Si3440DV	150	20	0.375	0.4		5.4		TSOP-6
SUM65N20-30	200	20	0.03			90		D2PAK (TO-263)
SUP57N20-33	200	20	0.033			90		TO-220
SUM27N20-78	200	20	0.078	0.083		40		D2PAK (TO-263)
Si4490DY	200	20	0.08	0.09		34		SO-8
Si7450DP	200	20	0.08	0.09		34		PowerPAK SO-8
SUD19N20-90	200	20	0.09	0.105		34		DPAK (TO-252)
SUM16N20-125	200	20	0.125	0.15		24		D2PAK (TO-263)
Si4418DY	200	20	0.13	0.142		20		SO-8
Si7462DP	200	20	0.13	0.142		20		PowerPAK SO-8
Si7820DN	200	20	0.24	0.25		12.1		PowerPAK 1212-8
Si4464DY	200	20	0.24	0.26		12		SO-8
Si7464DP	200	20	0.24	0.26		12		PowerPAK SO-8
SUM09N20-270	200	20	0.27	0.3		11		D2PAK (TO-263)
Si4462DY	200	20	0.48	0.51		6		SO-8
Si7302DN	220	20	0.32	0.34		14	9.1	PowerPAK 1212-8
SUM45N25-58	250	30	0.058	0.062		95		D2PAK (TO-263)
Si7434DP	250	20	0.155	0.162		34		PowerPAK SO-8
Si4434DY	250	20	0.155	0.162		34		SO-8
Si7802DN	250	20	0.435	0.445		14		PowerPAK 1212-8
Dual MOSFETs								
Si7942DP	100	20	0.049	0.06		16		PowerPAK SO-8
Si7956DP	150	20	0.105	0.115		17		PowerPAK SO-8
Si7946DP	150	20	0.15	0.168		12.6		PowerPAK SO-8

See page 34 for Secondary Side (Q3 and Q4) Selector and 24-V input (60-V  $V_{DS}$ ) selection.

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

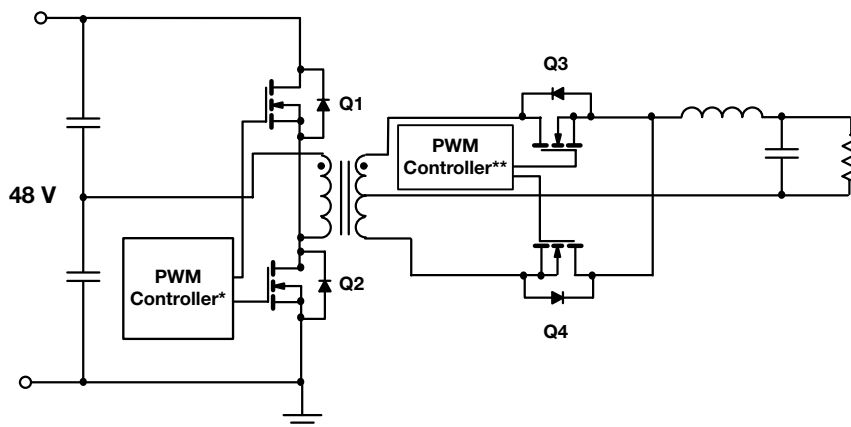
- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)





## Isolated Half-Bridge Converter

### Two (or four) Switch Primary Side MOSFET Selector (Q1 or Q2)



\* Example: Si9122 1A, Si9122A 1A

\*\* Examples: SiP11203, SiP11204

See page 57 for more information.

### Two (or four) Switch Primary Side MOSFET Selector (Q1 or Q2)

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 6 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	
Single MOSFETs								
Si7148DP	75	20	0.011		0.0145	68	33	PowerPAK S0-8
Si7812DN	75	20	0.037		0.046	16	8	PowerPAK 1212-8
SUD40N08-16	80	20	0.016			42		DPAK (T0-252)
Si7852DP	80	20	0.0165	0.022		34		PowerPAK S0-8
Si4896DY	80	20	0.0165	0.022		34		S0-8
Si4480EY	80	20	0.035	0.04		30		S0-8
SUM110N10-09	100	20	0.0095			110		D2PAK (T0-263)
SUP85N10-10	100	20	0.01		0.012	105		T0-220
SUV85N10-10	100	20	0.0105		0.012	105		T0-262
SUP60N10-16L	100	20	0.016		0.018	73		T0-220
SUM60N10-17	100	20	0.0165	0.019		65		D2PAK (T0-263)
SUD40N10-25	100	20	0.025		0.028	40		DPAK (T0-252)
Si7456DP	100	20	0.025	0.028		36		PowerPAK S0-8
Si4496DY	100	20	0.025	0.031		29		S0-8

**Notes:**

- $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- $r_{DS} = r_{SS}/2$
- $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- Not used
- $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- S1 and D2 connected
- Not used

- Schottky connected to channel 1
- Half-bridge
- Not used
- $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Two (or four) Switch Primary Side MOSFET Selector (Q1 or Q2), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 6 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	
Single MOSFETs, continued								
Si4486EY	100	20	0.025	0.028		36		S0-8
Si7454DP	100	20	0.034	0.04		24		PowerPAK S0-8
Si4484EY	100	20	0.034	0.04		24		S0-8
SUM34N10-35	100	20	0.035	0.04		35		D2PAK (TO-263)
Si4482DY	100	20	0.06	0.08		30		S0-8
Si7810DN	100	20	0.062	0.084		13		PowerPAK 1212-8
Si3430DV	100	20	0.17	0.185		5.5		TSOP-6
Si2328DS	100	20	0.25			3.3		SOT-23
SUM100N12-14L	125	20	0.0144		0.0154	135	67	D2PAK (TO-263)
Si4434DY	250	20	0.155	0.162		34		S0-8
Dual MOSFETs								
Si4980DY	80	20	0.075	0.095		15		S0-8
Si7942DP	100	20	0.049	0.06		16		PowerPAK S0-8
Si4982DY	100	20	0.15	0.18		15		S0-8
Si7922DN	100	20	0.195	0.23		5.2		PowerPAK 1212-8
Si7946DP	150	20	0.15	0.168		12.6		PowerPAK S0-8

See page 34 for Secondary Side (Q3 and Q4) Selector and 24-V input (60-V  $V_{DS}$ ) selection.

**Notes:**

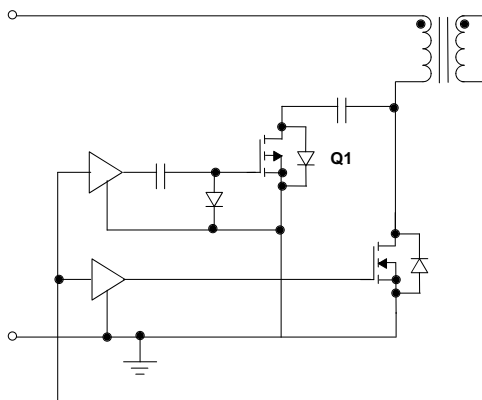
- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs. 4.5 V)

## Active Clamp

### P-channel MOSFET Selector (Q1)



Example active clamp configuration

### P-channel MOSFET Selector (Q1)

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)			Q <sub>g</sub> (nC)		Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 6 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	
Single MOSFETs								
Si7113DN	-100	20	0.113		0.145	35	16.5	PowerPAK 1212-8
Si7439DP	-150	20	0.09	0.095		88		PowerPAK S0-8
Si7117DN	-150	20	1.2	1.3		7.7		PowerPAK 1212-8
Si2325DS	-150	20	1.2	1.3		7.7		SOT-23
Si1411DH	-150	20	2.6	2.7		4.2		SC70-6
Si7431DP	-200	20	0.174	0.18		88		PowerPAK S0-8
Si2327DS	-200	20	2.35	2.45		8		SOT-23
Si1419DH	-200	20	5	5.1		4.1		SC70-6

**Notes:**

- $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- $r_{DS} = r_{SS}/2$
- $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- Not used
- $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- S1 and D2 connected
- Not used

- Schottky connected to channel 1
- Half-bridge
- Not used
- $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Secondary Side MOSFET Selector (Q3 or Q4)

### Singles

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single N-Channel MOSFETs										
Si7100DN	8	8		0.0035	0.0045			40		PowerPAK 1212-8
Si7858ADP	12	8		0.0026	0.0037			54		PowerPAK S0-8
Si4836DY	12	8		0.003	0.004	0.005		51		S0-8
Si4838DY	12	8		0.003	0.004			40		S0-8
Si7104DN	12	12		0.0037	0.007		46	23		PowerPAK 1212-8
Si7882DP	12	8		0.0055	0.008			21		PowerPAK S0-8
Si4866DY	12	8		0.0055	0.008			21		S0-8
Si7862ADP	16	8		0.003	0.0055			54		PowerPAK S0-8
Si4862DY	16	8		0.0033	0.0055			48		S0-8
SiE810DF	20	12		0.0016	0.0027		200	90		PolarPAK
SiE808DF	20	20	0.0016	0.0025			102	46		PolarPAK
Si4378DY	20	12		0.0027	0.0042			55		S0-8
Si7868ADP	20	16	0.00225	0.00275			98	46		PowerPAK S0-8
Si7864ADP	20	8		0.003	0.0042			57		PowerPAK S0-8
Si7866ADP	20	20	0.0024	0.003			83	39		PowerPAK S0-8
Si4864DY	20	8		0.0035	0.0047			47		S0-8
Si7136DP	20	20	0.0032	0.0045			51.5	24.5		PowerPAK S0-8
Si7458DP	20	12		0.0045	0.0075			38		PowerPAK S0-8
Si4876DY	20	12		0.005	0.0075			55		S0-8
SUB85N02-06	20	12		0.006	0.009			65		D2PAK (T0-263)
SUD50N02-06	20	12		0.006	0.009			65		DPAK (T0-252)
Si7108DN	20	16	0.0049	0.0061				20		PowerPAK 1212-8
Si7106DN	20	12		0.0062	0.0098			17.5		PowerPAK 1212-8
Si7448DP	20	12		0.0065	0.009			38		PowerPAK S0-8
Si4408DY	20	20	0.0045	0.0068				21		S0-8
Si7422DN	20	16	0.0061	0.0077				16		PowerPAK 1212-8
Si7110DN	20	20	0.0053	0.0078				14		PowerPAK 1212-8
SUD40N02-08	20	12		0.0085	0.014			26		DPAK (T0-252)
Si7368DP	20	16	0.0055	0.0085				17		PowerPAK S0-8

- Notes:**
- $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - $r_{DS} = r_{SS}/2$
  - $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- Not used
- $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- S1 and D2 connected
- Not used

- Schottky connected to channel 1
- Half-bridge
- Not used
- $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Secondary Side MOSFET Selector (Q3 or Q4), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single N-Channel MOSFETs, continued										
Si7366DP	20	20	0.0055	0.009				16		PowerPAK S0-8
SiE806DF	30	12	0.0017	0.0021			165	75		PolarPAK
SiE802DF	30	20	0.0019	0.0026			105	50		PolarPAK
Si7380ADP	30	12	0.003	0.0035			122	54		PowerPAK S0-8
Si4368DY	30	12	0.0032	0.0036				53		S0-8
Si7336ADP	30	20	0.003	0.004				36		PowerPAK S0-8
Si7880ADP	30	20	0.003	0.004			84	37		PowerPAK S0-8
Si4320DY	30	20	0.003	0.004				45		S0-8
Si4336DY	30	20	0.00325	0.0042				36		S0-8
Si7636DP	30	20	0.004	0.0048				36		PowerPAK S0-8
Si4442DY	30	12	0.0045	0.005	0.0075			36		S0-8
Si7892BDP	30	20	0.0042	0.0057				27		PowerPAK S0-8
Si4842BDY	30	20	0.0042	0.0057			68	29		S0-8
SUM110N03-04P	30	20	0.0042	0.0065				40		D2PAK (TO-263)
Si4356ADY	30	12	0.0055	0.0068			69	30		S0-8
SUV85N03-04P	30	20	0.0043	0.007			71			TO-262
Si4856ADY	30	20	0.0052	0.0076				21		S0-8
Si7440DP	30	20	0.0065	0.008				29		PowerPAK S0-8
Si7112DN	30	12	0.0075	0.0082				18		PowerPAK 1212-8
Si4856DY	30	20	0.006	0.0085				21		S0-8
Si4394DY	30	12	0.00825	0.00975				12.5		S0-8
Si7446BDP	30	20	0.0075	0.01				22	b	PowerPAK S0-8
Si7388DP	30	20	0.007	0.01				16.3		PowerPAK S0-8
Si4888DY	30	20	0.007	0.01				16.3		S0-8
Si7114DN	30	20	0.0075	0.01				12.5		PowerPAK 1212-8
Si7840BDP	30	20	0.0085	0.0105				14		PowerPAK S0-8
Si7860DP	30	20	0.008	0.011				13		PowerPAK S0-8
Si4860DY	30	20	0.008	0.011				13		S0-8
SiE800DF	30	20	0.0072	0.0115			23	12		PolarPAK
Si4884BDY	30	20	0.009	0.012			23.5	10.5		S0-8
Si7860ADP	30	20	0.0095	0.0125				13		PowerPAK S0-8
SUU50N03-09P	30	20	0.0095	0.014				15		TO-251

**Notes:** a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)  
b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)  
c.  $r_{DS} = r_{SS}/2$   
d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)  
f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)  
h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)  
i. Not used  
j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)  
k. S1 and D2 connected  
l. Not used

m. Schottky connected to channel 1  
n. Half-bridge  
o. Not used  
p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)  
q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Secondary Side MOSFET Selector (Q3 or Q4), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single N-Channel MOSFETs, continued										
SUD50N03-09P	30	20	0.0095	0.014				11		DPAK (TO-252)
SUR50N03-09P	30	20	0.0095	0.014				11		Reverse DPAK
Si7404DN	30	12	0.013	0.015	0.022			20		PowerPAK 1212-8
Si7806ADN	30	20	0.011	0.016				13.2	b	PowerPAK 1212-8
SUU50N03-12P	30	20	0.012	0.0175			28			TO-251
SUD50N03-12P	30	20	0.012	0.0175				13		DPAK (TO-252)
SUR50N03-12P	30	20	0.012	0.0175				13		Reverse DPAK
Si4892DY	30	20	0.012	0.02				8.7		SO-8
Si7806BDN	30	20	0.0145	0.0205			19	8.5		PowerPAK 1212-8
Si5480DU	30	20	0.016	0.022			22.5	11		PowerPAK ChipFET
Si7444DP	40	20	0.0061				105			PowerPAK SO-8
Si7884DP	40	20	0.007	0.0095				18.5		PowerPAK SO-8
Si7116DN	40	20	0.0078	0.01				15		PowerPAK 1212-8
Si7848DP	40	20	0.009	0.012				18.5		PowerPAK SO-8
Si4840DY	40	20	0.009	0.012				18.5		SO-8
SUD30N04-10	40	20	0.01	0.014			50			DPAK (TO-252)
SUV90N06-05	60	20	0.0052	0.0072			155			TO-262
SUU50N06-07L	60	20	0.0074	0.0088			96			TO-251
SUD50N06-07L	60	20	0.0074	0.0088			96			DPAK (TO-252)
SUR50N06-07L	60	20	0.0074	0.0088			96			Reverse DPAK
Si7452DP	60	20	0.0083				105			PowerPAK SO-8
Si7138DP	60	20	0.0078	0.009			90	55	d, q	PowerPAK SO-8
Si7478DP	60	20	0.0075	0.0088			105			PowerPAK SO-8
Si7370DP	60	20	0.011	0.013			46		d	PowerPAK SO-8
Si4470EY	60	20	0.011	0.013			46		d	SO-8
SUD40N06-25L	60	20	0.022	0.025			40			DPAK (TO-252)
Si7120DN	60	20	0.019	0.028			30			PowerPAK 1212-8
Si4450DY	60	20	0.024	0.03			31		d	SO-8
Si7850DP	60	20	0.022	0.031			18			PowerPAK SO-8
Si4850EY	60	20	0.022	0.031			18			SO-8
Si7414DN	60	20	0.025	0.036			16			PowerPAK 1212-8
Si5476DU	60	20	0.034	0.041			21	10.5		PowerPAK ChipFET

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs.  $10\text{ V}$ )
  - b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs.  $4.5\text{ V}$ )
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs.  $3.3\text{ V}$ )
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs.  $3.3\text{ V}$ )

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs.  $4.5\text{ V}$ )
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs.  $2.5\text{ V}$  or  $3.3\text{ V}$ )
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs.  $3.3\text{ V}$ )
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs.  $3.3\text{ V}$ )
- q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs.  $4.5\text{ V}$ )
- r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs.  $4.5\text{ V}$ )



## Secondary Side MOSFET Selector (Q3 or Q4), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V		
Single N-Channel MOSFETs, continued										
Si3458DV	60	20	0.1	0.13			8			TSOP-6
Si2308DS	60	20	0.16	0.22			4.8			SOT-23
Single P-Channel MOSFETs										
Si7445DP	-20	8		0.0077	0.0094	0.0125		92		PowerPAK SO-8
SUP90P06-09L	-60	20	0.0093	0.0118			160			TO-220
Si7415DN	-60	20	0.065	0.11			15			PowerPAK 1212-8

Duals, LITTLE FOOT *Plus* Schottky and Complementary

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
LITTLE FOOT <i>Plus</i> Schottky - Single MOSFETs												
Si5858DU	20	8		0.039	0.045	0.055		6	0.375	1		PowerPAK ChipFET
Si3812DV	20	20		0.125	0.2			2.1	1.1	1.5		TSOP-6
Si7374DP	30	20	0.0055	0.0066			81	38	0.39	1		PowerPAK SO-8
Si4852DY	30	20	0.012	0.0175				23	0.53	3		SO-8
Si4810BDY	30	20	0.0135	0.02				14.5	0.53	3	b	SO-8
Si4300DY	30	20	0.0185	0.033				8.7	0.5	1		SO-8
Dual MOSFETs												
Si4804BDY	30	20	0.022	0.03				7				SO-8
Si7212DN	30	12	0.036	0.039				7				PowerPAK 1212-8
Si7214DN	30	20	0.04	0.047				4.2				PowerPAK 1212-8
Si7970DP	40	20	0.019	0.026			23					PowerPAK SO-8
Si4942DY	40	20	0.021	0.028			21					SO-8
Si7216DN	40	20	0.032	0.039			12.5	5.5				PowerPAK 1212-8

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Duals, LITTLE FOOT Plus Schottky and Complementary), continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)				Q <sub>g</sub> (nC)		Schottky		Footnote	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>F</sub> (V)	I <sub>F</sub> (A)		
Dual MOSFETs, continued												
Si7222DN	40	12	0.042	0.047			19	8				PowerPAK 1212-8
Si4946BEY	60	20	0.041	0.052			17	9.2			b	S0-8
Si7220DN	60	20	0.06	0.075			13					PowerPAK 1212-8
LITTLE FOOT Plus Schottky - Dual MOSFETs												
Si4854DY	30	12	0.026	0.03	0.041			9	0.5	1		S0-8
LITTLE FOOT Plus Schottky - Asymmetric MOSFETs												
Si4816BDY	30	20	0.0185	0.0225				7.8			b, k	S0-8
	30	20	0.0115	0.016				11.6	0.5	1	b, k	
Si4818DY	30	20	0.022	0.03				8				S0-8
	30	20	0.0155	0.0205				15	0.5	1		
Complementary MOSFETs as separate drivers												
Si3850ADV	20	12		0.3	0.41			0.95				TSOP-6
	-20	12		0.64	0.98			1.1				
Si1553DL	20	12		0.385	0.63			0.8				SC70-6
	-20	12		0.995	1.8			1.2				
Si3552DV	30	20	0.105	0.175				2.1				TSOP-6
	-30	20	0.2	0.36				2.4				

**Notes:** a.  $Q_g$  @  $V_{GS} = 15\text{ V}$  (vs. 10 V)  
b.  $Q_g$  @  $V_{GS} = 5\text{ V}$  (vs. 4.5 V)  
c.  $r_{DS} = r_{SS}/2$   
d.  $r_{DS(on)}$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)  
e.  $r_{DS(on)}$  @  $V_{GS} = 3\text{ V}$  (vs. 3.3 V)  
f.  $r_{DS(on)}$  @  $V_{GS} = 3.7\text{ V}$  (vs. 3.3 V)

g.  $r_{DS(on)}$  @  $V_{GS} = 4.75\text{ V}$  (vs. 4.5 V)  
h.  $r_{DS(on)}$  @  $V_{GS} = 2.7\text{ V}$  (vs. 2.5 V or 3.3 V)  
i. Not used  
j.  $r_{DS(on)}$  @  $V_{GS} = 3.1\text{ V}$  (vs. 3.3 V)  
k. S1 and D2 connected  
l. Not used

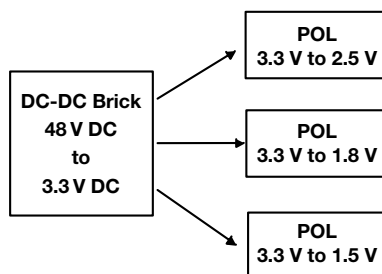
m. Schottky connected to channel 1  
n. Half-bridge  
o. Not used  
p.  $r_{DS(on)}$  @  $V_{GS} = 3.6\text{ V}$  (vs. 3.3 V)  
q.  $Q_g$  @  $V_{GS} = 6\text{ V}$  (vs. 4.5 V)  
r.  $r_{DS(on)}$  @  $V_{GS} = 8\text{ V}$  (vs. 4.5 V)


















## POL

- Ideal for 5-V or 3.3-V bus stepdown
- PowerPAK's superior  $P_D$  can potentially reduce the number of MOSFETs
- Low  $r_{DS(on)} \times Q_g$
- $Q_g$  optimized for 500 kHz+ operation

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> Ω					Q <sub>g</sub> (nC)	Package
			V <sub>GS</sub> = 10 V	V <sub>GS</sub> = 4.5 V	V <sub>GS</sub> = 2.5 V	V <sub>GS</sub> = 1.8 V	V <sub>GS</sub> = 1.5 V	V <sub>GS</sub> = 4.5 V	
Single MOSFETs									
Si7470DP	8	5		0.0021	0.0024	0.0028	0.0034	110	PowerPAK S0-8
Si7882DP	12	8		0.0055	0.008			21	PowerPAK S0-8
Si4866DY	12	8		0.0055	0.008			21	S0-8
Si7402DN	12	8		0.0057	0.0067	0.0085		36	PowerPAK 1212-8
Si4378DY	20	12		0.0027	0.0042			55	S0-8
Si7136DP	20	20	0.0032	0.0045				24.5	PowerPAK S0-8
Si5486DU	20	8		0.015	0.017	0.021		21	PowerPAK ChipFET
Si5484DU	20	12		0.016	0.021			16.5	PowerPAK ChipFET
Si7336ADP	30	20	0.003	0.004				36	PowerPAK S0-8
Si7636DP	30	20	0.004	0.0048				36	PowerPAK S0-8
LITTLE FOOT Plus Schottky - Single MOSFETs									
Si5858DU	20	8		0.039	0.045	0.055		6	PowerPAK ChipFET
Si4322DY	30	20	0.0085	0.0125				11.7	S0-8
Dual MOSFETs									
Si7940DP	12	8		0.017	0.025			11.5	PowerPAK S0-8
Si5938DU	20	8		0.039	0.045	0.055		6	PowerPAK ChipFET
Complementary MOSFETs									
Si7540DP	12	8		0.017	0.025			11.5	PowerPAK S0-8
	-12	8		0.032	0.053			13	



## Packaging Information

Power MOSFET Package		Max Length (mm)	Max Width (mm)	Max Footprint Area (mm <sup>2</sup> )	Max Height (mm)	Max Current (A)	Max Temp (°C)	R <sub>thJF</sub> or R <sub>thJC</sub> (°C/W)
TO-220		10.41	4.7	48.93	29.71	85	175	0.6
TO-262		10.41	4.7	48.93	25.27	85	175	0.6
D <sup>2</sup> PAK		15.88	10.41	165.37	4.83	110	175	0.4
						85	175	0.6
D <sup>2</sup> PAK-5						60	175	0.5
DAK		10.41	6.73	70.06	2.38	70	175	1.2
PowerPAK SO-8		6.2	5.26	32.61	1.2	29	150	1.5
PolarPAK®		6.2	5.2	32.24	0.85	38.4	150	1 + 2.7
SO-16		10	6.2	62.00	1.75	13.5	150	20
SO-8		5	6.2	31.00	1.75	25	150	16
TSSOP-8		3.1	6.6	20.46	1.2	11	150	52
PowerPAK 1212-8		3.4	3.4	11.56	1.2	14.4	150	2.4
TSOP-6		3.1	2.98	9.24	1.1	6.8	150	30
PowerPAK ChipFET		3.08	1.98	6.10	0.85	11.6	150	4
SOT-23		3.04	2.64	8.03	1.12	4.9	150	50
SC-70		2.2	2.4	5.28	1.1	3.9	150	45



## Alphanumeric Index

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si1302DL	30	20	0.48	0.7				0.86		0.24	0.08		1	0.64	0.31		SC70-3
Si1411DH	-150	20	2.6	2.7				4.2		0.9	1.3	8.5	2.5	0.52	1.56	d	SC70-6
Si1419DH	-200	20	5	5.1				4.1		0.8	1.3	17	2.5	0.38	1.56	d	SC70-6
Si1553DL	20	12		0.385	0.63				0.8	0.06	0.3		0.6	0.7	0.3		SC70-6
Si1553DL	-20	12		0.995	1.8				1.2	0.45	0.25		0.6	0.44	0.3		SC70-6
Si2301BDS	-20	8		0.1	0.15				4.5	0.7	1.1		0.45	2.4	0.9		SOT-23
Si2305DS	-8	8		0.052	0.071	0.108			10	2	2		0.45	3.5	1.25		SOT-23
Si2306BDS	30	20	0.047	0.065					3	1.6	0.6	5	1	4	1.25	b	SOT-23
Si2308DS	60	20	0.16	0.22				4.8		0.8	1		1.5	2	1.25		SOT-23
Si2325DS	-150	20	1.2	1.3				7.7		1.5	2.5	9	2.5	0.69	1.25	d	SOT-23
Si2327DS	-200	20	2.35	2.45				8		1.3	2.5	8	2.5	0.49	1.25	d	SOT-23
Si2328DS	100	20	0.25					3.3		0.47	1.45		2	1.5	1.25		SOT-23
Si3430DV	100	20	0.17	0.185				5.5		1.5	1.4		2	2.4	2	d	TSOP-6
Si3440DV	150	20	0.375	0.4				5.4		1.1	1.9	9	2	1.5	2	d	TSOP-6
Si3443BDV	-20	12		0.06	0.1				6	1.4	1.9	9.5	0.6	4.7	2	h	TSOP-6
Si3446ADV	20	12		0.037	0.065			13	5.6	1.45	1.4	2.8	0.8	6	3.2		TSOP-6
Si3454ADV	30	20	0.06	0.085				9		2.5	1.5		1	4.5	2		TSOP-6
Si3456BDV	30	20	0.035	0.052				8.6		1.8	1.5	2.8	1	6	2		TSOP-6
Si3458DV	60	20	0.1	0.13				8		4	2		1	3.2	2		TSOP-6
Si3460DV	20	8		0.027	0.032	0.038			13.5	2.3	2.2		0.45	6.8	2		TSOP-6
Si3552DV	30	20	0.105	0.175					2.1	0.7	0.7		1	2.5	1.15		TSOP-6
Si3552DV	-30	20	0.2	0.36					2.4	0.9	0.8		1	1.8	1.15		TSOP-6
Si3812DV	20	20		0.125	0.2				2.1	0.3	0.4		0.6	2.4	1.15		TSOP-6
Si3850ADV	20	12		0.3	0.41				0.95	0.22	0.24	3.5	0.6	1.4	1.08		TSOP-6
Si3850ADV	-20	12		0.64	0.98				1.1	0.28	0.26	10.5	0.6	0.96	1.08		TSOP-6
Si3867DV	-20	12		0.051	0.1				7	2.3	1.6		0.6	5.1	2		TSOP-6
Si3869DV	-12	8		0.036	0.05	0.07			20.5	1.7	1.7	12	0.4	8.4	4.1		TSOP-6
Si3871DV	-20	20		0.105	0.175				3.5	0.9	0.9	9.4	0.6	2.7	1.25		TSOP-5
Si4300DY	30	20	0.0185	0.033					8.7	2.25	4.2	2	0.8	9	2.5		S0-8
Si4304DY	30	12	0.0032	0.0037				79.5	36	8.5	6.2	1.25	0.6	36	7.8		S0-8
Si4308DY	30	20	0.012	0.018					11.5	3	4.5	1.45	0.8	9.6	2		S0-14
Si4308DY	30	12	0.01	0.011					40	10	8.8	0.8	0.8	13.5	3		S0-14

**Notes:** a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)  
b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)  
c.  $r_{DS} = r_{SS}/2$   
d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)  
f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)  
h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)  
i. Not used  
j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)  
k. S1 and D2 connected  
l. Not used

m. Schottky connected to channel 1  
n. Half-bridge  
o. Not used  
p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)  
q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Alphanumeric Index, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)					Q <sub>g</sub> (nC)		Q <sub>GS</sub> (nC)	Q <sub>GD</sub> (nC)	R <sub>g</sub> Typ (W)	V <sub>th</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	Footnote	Package
			V <sub>GS</sub> = 10V	V <sub>GS</sub> = 4.5V	V <sub>GS</sub> = 2.5V	V <sub>GS</sub> = 1.8V	V <sub>GS</sub> = 1.5V	V <sub>GS</sub> = 10V	V <sub>GS</sub> = 4.5V								
Si4320DY	30	20	0.003	0.004					45	20	16	1.1	1	25	3.5		S0-8
Si4324DY	30	20	0.0032	0.0042				55.5	25.5	11.6	6.6	1.25	1.4	36	7.8		S0-8
Si4330DY	30	20	0.0165	0.022					13	7.1	4.7	1	1	8.7	2		S0-8
Si4336DY	30	20	0.00325	0.0042					36	18	10	1.3	1.5	36	7.8		S0-8
Si4340DY	20	20	0.012	0.0175					10	3.3	3.1	0.9	0.8	9.6	2		S0-14
Si4340DY	20	16	0.01	0.0115					17	4.5	4.5	1.4	0.8	13.5	3		S0-14
Si4346DY	30	12	0.023	0.025	0.036				6.5	2.3	1.1	0.5	0.7	8	2.5	e	S0-8
Si4348DY	30	12	0.0125	0.014					15	5	4.3	0.5	0.8	11	2.5		S0-8
Si4350DY	20	20	0.012	0.0175					10	3.3	3.1	0.9	0.8	9.6	2		S0-14
Si4350DY	20	20	0.0075	0.01					20	6.2	6.8	1.4	1	15	3		S0-14
Si4354DY	30	12	0.0165	0.0185					7	1.85	1.2	0.9	0.7	9.5	2.5		S0-8
Si4356ADY	30	12	0.0055	0.0068				69	30	7.5	6.5	1.25	0.6	26	6.5		S0-8
Si4362BDY	30	12	0.0046	0.0054				75	36	9	6.5	1.05	0.6	29	6.6		S0-8
Si4364DY	30	16	0.0045	0.0055					48	16	11	1	0.8	20	3.5		S0-8
Si4366DY	30	12	0.0048	0.0055					48	17	10	1	0.6	20	3.5		S0-8
Si4368DY	30	12	0.0032	0.0036					53	17.5	6.5	1.2	0.6	25	3.5		S0-8
Si4370DY	30	20	0.022	0.03					7	2.9	2.5	1.5	1	7.5	2		S0-8
Si4370DY	30	12	0.022	0.028					11.5	3.8	3.5	1.8	0.8	7.5	2		S0-8
Si4376DY	30	20	0.02	0.0275					9	3.8	3.1	1.3	1	7.5	2		S0-8
Si4376DY	30	12	0.019	0.023					12.5	4	3.2	1.3	0.8	7.5	2		S0-8
Si4378DY	20	12		0.0027	0.0042				55	16	10	1.3	0.6	25	3.5		S0-8
Si4382DY	30	20	0.0047	0.0062					27	11	9.5	0.95	1.3	20	3.5		S0-8
Si4384DY	30	20	0.0085	0.0125					12	5.9	4	1.7	1	15	3.1		S0-8
Si4386DY	30	20	0.007	0.0095					11	5.8	3	1.7	1.5	16	3.1		S0-8
Si4390DY	30	20	0.0095	0.0135					10	3.5	2.1	0.8	0.8	12.5	3		S0-8
Si4392ADY	30	20	0.0075	0.0115				25	12	3.7	3.1	1.9	1	21.5	6.25		S0-8
Si4392DY	30	20	0.00975	0.01375					10	3.5	2.6	1.6	1	12.5	3		S0-8
Si4394DY	30	12	0.00825	0.00975					12.5	3.9	2.1	1.2	0.6	15	2.7		S0-8
Si4406DY	30	20	0.0045	0.0055					34	15	10	1	1	20	3.5		S0-8
Si4408DY	20	20	0.0045	0.0068					21	8.9	6.4	1	1	21	3.5		S0-8
Si4412ADY	30	20	0.024	0.035				16		3	1.5		1	8	2.5		S0-8
Si4418DY	200	20	0.13	0.142				20		4.5	6.5	2	2	3	2.5	d	S0-8
Si4426DY	20	12		0.025	0.035				25	6.5	4		0.6	8.5	2.5		S0-8
Si4433DY	-20	8		0.11	0.16	0.24			5.2	1.2	1		0.45	3.9	2.5		S0-8

- Notes:**
- a. Q<sub>g</sub> @ V<sub>GS</sub> = 15 V (vs. 10 V)
  - b. Q<sub>g</sub> @ V<sub>GS</sub> = 5 V (vs. 4.5 V)
  - c. r<sub>DS</sub> = r<sub>SS</sub>/2
  - d. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 6 V (vs. 4.5 V)
  - e. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3 V (vs. 3.3 V)
  - f. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.7 V (vs. 3.3 V)

- g. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 4.75 V (vs. 4.5 V)
- h. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 2.7 V (vs. 2.5 V or 3.3 V)
- i. Not used
- j. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.1 V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.6 V (vs. 3.3 V)
- q. Q<sub>g</sub> @ V<sub>GS</sub> = 6 V (vs. 4.5 V)
- r. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 8 V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si4434DY	250	20	0.155	0.162				34		6.8	10.5	1.2	2	3	3.1	d	S0-8
Si4442DY	30	12	0.0045	0.005	0.0075				36	8	10.5		0.6	22	3.5		S0-8
Si4450DY	60	20	0.024	0.03				31		7.7	8.3		2	7.5	2.5	d	S0-8
Si4462DY	200	20	0.48	0.51				6		0.9	1.9	3.7	2	1.5	2.5	d	S0-8
Si4464DY	200	20	0.24	0.26				12		2.5	3.8	2.5	2	2.2	2.5	d	S0-8
Si4470EY	60	20	0.011	0.013				46		11.5	11.5		2	12.7	3.75	d	S0-8
Si4480EY	80	20	0.035	0.04				30		9	5.6		2	6.2	3	d	S0-8
Si4482DY	100	20	0.06	0.08				30		7.5	7		2	4.6	2.5	d	S0-8
Si4484EY	100	20	0.034	0.04				24		7.6	5.4		2	6.9	3.8	d	S0-8
Si4486EY	100	20	0.025	0.028				36		10	8.6		2	7.9	3.8	d	S0-8
Si4488DY	150	20	0.05					30		8.5	8.5		2	5	3.1		S0-8
Si4490DY	200	20	0.08	0.09				34		7.5	12		2	4	3.1	d	S0-8
Si4496DY	100	20	0.025	0.031				29		9.9	10.3	1	2	7.7	3.1	d	S0-8
Si4539ADY	30	20	0.036	0.053				13		2.3	2		1	5.9	2		S0-8
Si4539ADY	-30	20	0.053	0.09				15		4	2		1	4.9	2		S0-8
Si4542DY	30	20	0.025	0.035				30		7.5	3.5		1	6.9	2		S0-8
Si4542DY	-30	20	0.032	0.045				32		7	5		1	6.1	2		S0-8
Si4544DY	30	20	0.035	0.05				18		4.2	3.5		1	6.5	2.4		S0-8
Si4544DY	-30	20	0.045	0.09				19		4.5	3.6		1	5.7	2.4		S0-8
Si4620DY	30	20	0.035	0.052				8.6	4.2	1.8	1.5	2.8	1.2	7.5	3.1		S0-8
Si4621DY	-20	20	0.054	0.094				8.7	4.5	1.7	1.8	9	1	6.2	3.1		S0-8
Si4630DY	25	16	0.0027	0.0032				107.5	49	15.7	13.6	1.5	1	40	7.8		S0-8
Si4632DY	25	16	0.0027	0.0033				108	49	19	11	1.3	1.2	40	7.8		S0-8
Si4682DY	30	20	0.0094	0.0135				24	11	4	3.1	0.55	1.4	16	4.45		S0-8
Si4684DY	30	12	0.0094	0.0115				30	14	3	2.8	0.55	0.6	16	4.45		S0-8
Si4686DY	30	20	0.0095	0.014				17	9.2	4.1	2.8	0.8	1	18.2	5.2	b	S0-8
Si4724CY	30			0.0375										5.1	1.2		S0-16
Si4724CY	30			0.029										6.5	1.2		S0-16
Si4732CY	30			0.028										5.3	1.2		S0-16
Si4732CY	30			0.008										11	1.2		S0-16
Si4736DY	30	12	0.0095	0.011					37	10	8.8	1	1	13	3.1		S0-8
Si4738CY	20			0.009	0.011									8.9	1.2		S0-16
Si4738CY	20			0.006	0.0285									14.29	1.2		S0-16
Si4768CY	30			0.017										5.3	1.2		S0-16

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Alphanumeric Index, continued

Part Number	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	r <sub>DS(on)</sub> (Ω)					Q <sub>g</sub> (nC)		Q <sub>GS</sub> (nC)	Q <sub>GD</sub> (nC)	R <sub>g</sub> Typ (W)	V <sub>th</sub> (V)	I <sub>D</sub> (A)	P <sub>D</sub> (W)	Footnote	Package
			V <sub>GS</sub> = 10V	V <sub>GS</sub> = 4.5V	V <sub>GS</sub> = 2.5V	V <sub>GS</sub> = 1.8V	V <sub>GS</sub> = 1.5V	V <sub>GS</sub> = 10V	V <sub>GS</sub> = 4.5V								
Si4768CY	30			0.0082										11	1.2		S0-16
Si4770CY	20			0.01	0.011									8.9	1.2		S0-16
Si4770CY	20			0.006	0.0285									14.29	1.2		S0-16
Si4804BDY	30	20	0.022	0.03					7	2.9	2.5	1.5	0.8	7.5	2		S0-8
Si4808DY	30	20	0.022	0.03				13		2	2.7	1	0.8	7.5	2		S0-8
Si4810BDY	30	20	0.0135	0.02					14.5	6.3	4.7	0.55	1	10	2.5	b	S0-8
Si4812BDY	30	20	0.016	0.021					8.5	3	2.6	0.7	1	9.5	2.5	b	S0-8
Si4814BDY	30	20	0.018	0.023					6.6	2.9	2.3	1.9		10	3.3	k	S0-8
Si4814BDY	30	20	0.018	0.022					8.9	3.4	2.4	2.3		10.5	3.5	k	S0-8
Si4816BDY	30	20	0.0185	0.0225					7.8	2.9	2.3	3	1	6.8	1.4	b, k	S0-8
Si4816BDY	30	20	0.0115	0.016					11.6	4.8	3.7	1.8	1	11.4	2.4	b, k	S0-8
Si4818DY	30	20	0.022	0.03					8	1.75	3.2		0.8	6.3	1.4		S0-8
Si4818DY	30	20	0.0155	0.0205					15	5.3	4.6		1	9.5	2.4		S0-8
Si4820DY	30	20	0.013	0.02					20	8	7		1	10	2.5		S0-8
Si4830ADY	30	20	0.022	0.03					7	2.9	2.5	1.5	0.8	7.5	2	k	S0-8
Si4832DY	30	20	0.018	0.028					13	4	5.6		1	9	2.5		S0-8
Si4834BDY	30	20	0.022	0.03					7	2.9	2.5	1.5	0.8	7.5	2	m	S0-8
Si4835CDY	-30	25	0.017	0.03					22	7.5	9	2.6	1.5	9.6	2.5	b	S0-8
Si4836DY	12	8		0.003	0.004	0.005			51	6.6	9.1	2	0.4	25	3.5		S0-8
Si4837DY	-30	20	0.02	0.03					22	9	6.6		1	8.3	2.5		S0-8
Si4838DY	12	8		0.003	0.004				40	6.7	9.2		0.6	25	3.5		S0-8
Si4840DY	40	20	0.009	0.012					18.5	6	7.5		1	14	3.1		S0-8
Si4842BDY	30	20	0.0042	0.0057				68	29	12.6	9.4	1.25	1.4	28	6.25		S0-8
Si4845DY	-20	12		0.21	0.345				2.9	0.72	0.65	5.5	0.5	2.7	2.75		S0-8
Si4848DY	150	20	0.085	0.095				17		3.2	6		2	3.7	3	d	S0-8
Si4850EY	60	20	0.022	0.031				18		3.4	5.3		1	8.5	3.3		S0-8
Si4852DY	30	20	0.012	0.0175				23	8.6	7.2			1	11	2.5		S0-8
Si4854DY	30	12	0.026	0.03	0.041			9	2.1	2.6			0.6	6.9	2		S0-8
Si4856ADY	30	20	0.0052	0.0076				21	8.2	7.2	1.5	1.5	26	3			S0-8
Si4856DY	30	20	0.006	0.0085				21	8	7.2	1.5	1	17	3			S0-8
Si4858DY	30	20	0.00525	0.007				30.5	13.5	9.5	1	1	20	3.5			S0-8
Si4860DY	30	20	0.008	0.011				13	5	4	2	1	16	3.5			S0-8
Si4862DY	16	8		0.0033	0.0055			48	11.8	8.9	1	0.6	25	3.5			S0-8
Si4864DY	20	8		0.0035	0.0047			47	10	13.4	1	0.6	25	3.5			S0-8

- Notes:**
- a. Q<sub>g</sub> @ V<sub>GS</sub> = 15 V (vs. 10 V)
  - b. Q<sub>g</sub> @ V<sub>GS</sub> = 5 V (vs. 4.5 V)
  - c. r<sub>DS</sub> = r<sub>SS</sub>/2
  - d. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 6 V (vs. 4.5 V)
  - e. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3 V (vs. 3.3 V)
  - f. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.7 V (vs. 3.3 V)

- g. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 4.75 V (vs. 4.5 V)
- h. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 2.7 V (vs. 2.5 V or 3.3 V)
- i. Not used
- j. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.1 V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 3.6 V (vs. 3.3 V)
- q. Q<sub>g</sub> @ V<sub>GS</sub> = 6 V (vs. 4.5 V)
- r. r<sub>DS(on)</sub> @ V<sub>GS</sub> = 8 V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si4866DY	12	8		0.0055	0.008				21	4.6	3.5	2	0.6	17	3		S0-8
Si4873DY	-20	8		0.016	0.021	0.028			40	5.2	8	1.9	0.4	8.3	2	b	S0-8
Si4876DY	20	12		0.005	0.0075				55	13	11		0.6	21	3		S0-8
Si4884BDY	30	20	0.009	0.012				23.5	10.5	4.3	3	1.4	1	16.5	4.45		S0-8
Si4888DY	30	20	0.007	0.01					16.3	4	5.9		0.8	16	3.5		S0-8
Si4892DY	30	20	0.012	0.02					8.7	2.4	3.5	1	0.8	12.4	3.1		S0-8
Si4894BDY	30	20	0.011	0.016					13.2	5.3	4.3	1.8	1	12	2.5	b	S0-8
Si4896DY	80	20	0.0165	0.022				34		7.5	11		2	9.5	3.1	d	S0-8
Si4914DY	30	20	0.023	0.032					5.6	2.3	1.7	2.3	1	7	1.9		S0-8
Si4914DY	30	20	0.02	0.027					7.3	2.8	2.2	1.6	1	7.4	2		S0-8
Si4942DY	40	20	0.021	0.028				21		3.3	5.8	1.1	1	7.4	2.1		S0-8
Si4944DY	30	20	0.0095	0.016					13.5	7.1	4.7	1	1	12.2	2.3		S0-8
Si4946BEY	60	20	0.041	0.052				17	9.2	3.3	3.7	6.5	1	6.5	3.7	b	S0-8
Si4972DY	30	20	0.0145	0.0195				18.5	8.3	3.9	2.7	2.5	1.5	10.8	3.1		S0-8
Si4972DY	30	20	0.0265	0.036				9.6	4	1.9	1.3	2.9	1.5	7.2	2.5		S0-8
Si4974DY	30	20	0.019	0.026					7	2.6	3	1.5	1	8	2		S0-8
Si4974DY	30	20	0.035	0.048					3.3	1.2	1.5	1.95	1	6	2		S0-8
Si4976DY	30	20	0.027	0.034					5.4	2.3	1.5	2.7	1	6.5	1.85	b, k	S0-8
Si4976DY	30	20	0.017	0.02					9.2	4.4	2.6	2.7	1	8.5	2	b, k	S0-8
Si4978DY	30	20	0.023	0.032					5.6	2.3	1.7	2.3	1	7	1.9	b	S0-8
Si4978DY	30	20	0.02	0.027					7.3	2.8	2.2	1.6	1	7.4	2	b	S0-8
Si4980DY	80	20	0.075	0.095				15		3.2	4		2	3.7	2	d	S0-8
Si4982DY	100	20	0.15	0.18				15		4	2.7		2	2.6	2	d	S0-8
Si5476DU	60	20	0.034	0.041				21	10.5	3.5	4.2	3.3	1	12	31		PowerPAK ChipFET
Si5480DU	30	20	0.016	0.022				22.5	11	4.4	3.7	5.9	1	12	31		PowerPAK ChipFET
Si5483DU	-20	12		0.03	0.043			20	9.3	2	2	7	0.6	12	31		PowerPAK ChipFET
Si5484DU	20	12		0.016	0.021			35.5	16.5	3.5	4	4.5	0.6	12	31		PowerPAK ChipFET
Si5486DU	20	8		0.015	0.017	0.021			21	3.3	3.1	5	0.4	12	31		PowerPAK ChipFET

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si5858DU	20	8		0.039	0.045	0.055			6	0.91	0.7	1.9	0.4	6	8.3		PowerPAK ChipFET
Si5938DU	20	8		0.039	0.045	0.055			6	0.91	0.7	1.9	0.4	6	8.3		PowerPAK ChipFET
Si6410DQ	30	20	0.014	0.021					22.5	9	7		1	7.8	1.5		TSSOP-8
Si6434DQ	30	20	0.028	0.042				18		3.3	2.6		1	5.6	1.5		TSSOP-8
Si6466ADQ	20	8		0.014	0.02				18	3.2	4		0.45	8.1	1.5		TSSOP-8
Si6544BDQ	30	20	0.032	0.046				9.5		1.8	1.55	0.45	1	4.3	1.14		TSSOP-8
Si6544BDQ	-30	20	0.043	0.073				16		2.3	4.5	8.8	1	3.8	1.14		TSSOP-8
Si7100DN	8	8		0.0035	0.0045				40	3.8	8.2	1.1	0.4	35	52		PowerPAK 1212-8
Si7104DN	12	12		0.0037	0.007			46	23	5.3	5.1	1.2	0.6	35	52		PowerPAK 1212-8
Si7106DN	20	12		0.0062	0.0098				17.5	6.6	2.8	1.4	0.6	19.5	3.8		PowerPAK 1212-8
Si7108DN	20	16	0.0049	0.0061					20	6.3	4.9	1.4	1	22	3.8		PowerPAK 1212-8
Si7110DN	20	20	0.0053	0.0078					14	7	4.5	1.4	1.5	21.1	3.8		PowerPAK 1212-8
Si7112DN	30	12	0.0075	0.0082					18	6.2	3.1	1.2	0.6	17.8	3.8		PowerPAK 1212-8
Si7113DN	-100	20	0.113	0.145				35	16.5	4.7	8	5.3	1	13.2	52		PowerPAK 1212-8
Si7114DN	30	20	0.0075	0.01					12.5	6.3	3.6	1.4	1	18.3	3.8		PowerPAK 1212-8
Si7116DN	40	20	0.0078	0.01					15	6.7	5.1	1.4	1.5	16.4	3.8		PowerPAK 1212-8
Si7117DN	-150	20	1.2	1.3				7.7		1.5	2.5	9	2.5	2.17	12.5	d	PowerPAK 1212-8
Si7120DN	60	20	0.019	0.028				30		6.9	5.8	1.3	1.5	10	3.8		PowerPAK 1212-8
Si7136DP	20	20	0.0032	0.0045				51.5	24.5	10.3	6.5	0.8	1	30	39		PowerPAK S0-8
Si7138DP	60	20	0.0078	0.009				90	55	27.5	11	0.6	2	30	96	d, q	PowerPAK S0-8
Si7148DP	75	20	0.011	0.0145				68	33	9.5	16.8	1.1	1.5	28	96		PowerPAK S0-8

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si7212DN	30	12	0.036	0.039					7	2	1.7	3	0.6	6.8	2.6		PowerPAK 1212-8
Si7214DN	30	20	0.04	0.047					4.2	1.9	1	3	1	6.4	2.6		PowerPAK 1212-8
Si7216DN	40	20	0.032	0.039				12.5	5.5	2	2	3.4	1	6	20.8		PowerPAK 1212-8
Si7220DN	60	20	0.06	0.075				13		2.3	2.6	2	1	4.8	2.6		PowerPAK 1212-8
Si7222DN	40	12	0.042	0.047				19	8	1.5	2.4	1.9	0.6	6	17.8		PowerPAK 1212-8
Si7302DN	220	20	0.32	0.34				14	9.1	2.8	4.2	0.8	2	8.4	52	d	PowerPAK 1212-8
Si7336ADP	30	20	0.003	0.004					36	18	10	1.3	1	30	5.4		PowerPAK SO-8
Si7342DP	30	12	0.00825	0.00975					12.5	3.9	2.1	1.2	0.6	15	5		PowerPAK SO-8
Si7344DP	20	20	0.008	0.012					10	3.3	3.1	1	0.8	17	4.1		PowerPAK SO-8
Si7348DP	20	20	0.0125	0.02					5.7	2.2	2	1.3	1	14	4.1		PowerPAK SO-8
Si7358ADP	30	20	0.0042	0.0059					30.5	12.5	10	1	1	23	5.4		PowerPAK SO-8
Si7366DP	20	20	0.0055	0.009					16	6	5.2		1	20	5		PowerPAK SO-8
Si7368DP	20	16	0.0055	0.0085					17	4.5	4.5	1.5	0.7	20	5		PowerPAK SO-8
Si7370DP	60	20	0.011	0.013				46		11.5	11.5	0.85	2	15.8	5.2	d	PowerPAK SO-8
Si7374DP	30	20	0.0055	0.0066				81	38	18	11	0.95	1.5	24	56		PowerPAK SO-8
Si7380ADP	30	12	0.003	0.0035				122	54	14.5	8	1	0.6	40	83		PowerPAK SO-8
Si7382DP	30	20	0.0047	0.0062					27	11	9.5	0.95	1.3	24	5		PowerPAK SO-8
Si7384DP	30	20	0.0085	0.0125					12	5.9	4	1.7	1	18	5		PowerPAK SO-8
Si7386DP	30	20	0.007	0.0095					11.5	5.8	3	1.7	1.5	19	5		PowerPAK SO-8

**Notes:** a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)  
b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)  
c.  $r_{DS} = r_{SS}/2$   
d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)  
f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)  
h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)  
i. Not used  
j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)  
k. S1 and D2 connected  
l. Not used

m. Schottky connected to channel 1  
n. Half-bridge  
o. Not used  
p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)  
q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si7388DP	30	20	0.007	0.01					16.3	4	5.9		0.8	19	5		PowerPAK SO-8
Si7390DP	30	20	0.0095	0.0135					10	3.5	2.1	0.8	0.8	15	5		PowerPAK SO-8
Si7392ADP	30	20	0.0075	0.0115				25	12	3.7	3.1	1.9	1	30	27.5		PowerPAK SO-8
Si7392DP	30	20	0.00975	0.01375					10	3.5	2.6	1.6	1	15	5		PowerPAK SO-8
Si7402DN	12	8		0.0057	0.0067	0.0085			36	4	9.5	1.8	0.45	20	3.8		PowerPAK 1212-8
Si7404DN	30	12	0.013	0.015	0.022				20	5.8	7.1		0.6	13.3	3.8		PowerPAK 1212-8
Si7414DN	60	20	0.025	0.036				16		2.7	4.4	1	1	8.7	3.8		PowerPAK 1212-8
Si7415DN	-60	20	0.065	0.11				15		4	3.2		1	5.7	3.8		PowerPAK 1212-8
Si7422DN	20	16	0.0061	0.0077					16	4.52	4.7	1	0.6	20.3	3.8		PowerPAK 1212-8
Si7431DP	-200	20	0.174	0.18				88		16.5	25	3	2	3.8	5.4	d	PowerPAK SO-8
Si7434DP	250	20	0.155	0.162				34		6.8	10.5	1.2	2	3.8	5.2	d	PowerPAK SO-8
Si7439DP	-150	20	0.09	0.095				88		17.5	26.5	3	2	5.2	5.4	d	PowerPAK SO-8
Si7440DP	30	20	0.0065	0.008					29	10.5	10	1	1	21	5.4		PowerPAK SO-8
Si7444DP	40	20	0.0061					105		39.4	21.7	1	3.4	23.6	5.4		PowerPAK SO-8
Si7445DP	-20	8		0.0077	0.0094	0.0125			92	19	16.5	2	0.45	19	5.4		PowerPAK SO-8
Si7446BDP	30	20	0.0075	0.01					22	8.3	4.7	0.8	1	19	4.8	b	PowerPAK SO-8
Si7448DP	20	12		0.0065	0.009				38	8	8.5	1	0.6	22	5.2		PowerPAK SO-8
Si7450DP	200	20	0.08	0.09				34		7.5	12		2	5.3	5.2	d	PowerPAK SO-8
Si7452DP	60	20	0.0083					105		40	21	1	3.4	19.3	5.4		PowerPAK SO-8

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si7454DP	100	20	0.034	0.04				24		7.6	5.4		2	7.8	4.8	d	PowerPAK SO-8
Si7456DP	100	20	0.025	0.028				36		10	8.6	1	2	9.3	5.2	d	PowerPAK SO-8
Si7458DP	20	12		0.0045	0.0075				38	8	8.5		0.6	22	5.2		PowerPAK SO-8
Si7462DP	200	20	0.13	0.142				20		4.5	6.5	2	2	4.1	4.8	d	PowerPAK SO-8
Si7464DP	200	20	0.24	0.26				12		2.5	3.8	2.5	2	2.8	4.2	d	PowerPAK SO-8
Si7470DP	8	5		0.0021	0.0024	0.0028	0.0034		110	10.5	16	1	0.35	40	83		PowerPAK SO-8
Si7478DP	60	20	0.0075	0.0088				105		22	19	1	1	20	5.4		PowerPAK SO-8
Si7501DN	30	20	0.035	0.05				9		2	1.3	3	1	7.7	3.1		PowerPAK 1212-8
Si7501DN	-30	25	0.051	0.075				12.5		2.5	3.6	9	1	6.4	3.1	d	PowerPAK 1212-8
Si7540DP	12	8		0.017	0.025				11.5	3.2	2.5	1.7	0.6	11.8	3.5		PowerPAK SO-8
Si7540DP	-12	8		0.032	0.053				13	4.1	1.9	3.5	0.6	8.9	3.5		PowerPAK SO-8
Si7606DN	125	20	0.108	0.115				18.5	9.1	4	3.4	1	1	14.5	52		PowerPAK 1212-8
Si7634DP	30	20	0.0052	0.0076				52	21	8.2	7.2	1.5	1.5	40	48		PowerPAK SO-8
Si7636DP	30	20	0.004	0.0048					36	18	10	1.3	1	28	5.2		PowerPAK SO-8
Si7664DP	30	12	0.0031	0.0036				85	38	10.5	5.5	0.95	0.6	40	83		PowerPAK SO-8
Si7668ADP	30	12	0.003	0.0034				110	52	14.5	8	1	0.6	40	83		PowerPAK SO-8
Si7674DP	30	20	0.0033	0.0046				60	28	13.6	6.8	0.95	1	40	83		PowerPAK SO-8
Si7682DP	30	20	0.009	0.013				24	11	4	3.1	0.55	1.4	20	27.5		PowerPAK SO-8
Si7684DP	30	12	0.009	0.011				30	14	3	2.8	0.55	0.6	20	27.5		PowerPAK SO-8

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si7686DP	30	20	0.0095	0.014				17	9.2	4.1	2.8	0.8	1	35	37.9	b	PowerPAK SO-8
Si7802DN	250	20	0.435	0.445				14		2.8	4.4	1.2	2.4	1.95	3.8	d	PowerPAK 1212-8
Si7804DN	30	20	0.0185	0.03					8.7	1.5	3.5		0.8	10	3.5	b	PowerPAK 1212-8
Si7806ADN	30	20	0.011	0.016					13.2	5.3	4.3	1.8	1	14	3.7	b	PowerPAK 1212-8
Si7806BDN	30	20	0.0145	0.0205				19	8.5	3.6	3	2	1	12.6	3.8		PowerPAK 1212-8
Si7810DN	100	20	0.062	0.084				13		3	4.6		2	5.4	3.8	d	PowerPAK 1212-8
Si7812DN	75	20	0.037	0.046				16	8	2.8	3.6	1	1	16	52		PowerPAK 1212-8
Si7818DN	150	20	0.135	0.142				20		2.7	4.7	1.7	2	3.4	3.8	d	PowerPAK 1212-8
Si7820DN	200	20	0.24	0.25				12.1		2.5	4.1	2.3	2	2.6	3.8	d	PowerPAK 1212-8
Si7840BDP	30	20	0.0085	0.0105					14	6	3.5	0.7	1	16.5	4.1		PowerPAK SO-8
Si7842DP	30	20	0.022	0.03				13		2	2.7	1	0.8	10	3.5		PowerPAK SO-8
Si7844DP	30	20	0.022	0.03				13		2	2.7	1	0.8	10	3.5		PowerPAK SO-8
Si7846DP	150	20	0.05					30		8.5	8.5		2	24.5	5.2		PowerPAK SO-8
Si7848DP	40	20	0.009	0.012					18.5	6	7.5	1	1	17	5		PowerPAK SO-8
Si7850DP	60	20	0.022	0.031				18		3.4	5.3	1	1	10.3	4.5		PowerPAK SO-8
Si7852DP	80	20	0.0165	0.022				34		7.5	11	1	2	12.5	5.2	d	PowerPAK SO-8
Si7856ADP	30	20	0.0037	0.0048					39	13.5	11.5	1	1	25	5.4		PowerPAK SO-8
Si7858ADP	12	8		0.0026	0.0037				54	10	16	1.2	0.6	29	5.4		PowerPAK SO-8
Si7860ADP	30	20	0.0095	0.0125					13	5	4	1.7	1	16	4.8		PowerPAK SO-8

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si7860DP	30	20	0.008	0.011					13	5	4	2	1	18	5		PowerPAK SO-8
Si7862ADP	16	8		0.003	0.0055				54	11.5	12.5	1.1	0.6	29	5.4		PowerPAK SO-8
Si7864ADP	20	8		0.003	0.0042				57	8.5	17	1.3	0.6	29	5.4		PowerPAK SO-8
Si7866ADP	20	20	0.0024	0.003				83	39	12.5	10.3	1.1	0.8	40	83		PowerPAK SO-8
Si7868ADP	20	16	0.00225	0.00275				98	46	9.5	8.8	1.1	0.6	40	83		PowerPAK SO-8
Si7872DP	30	20	0.022	0.03					7	2.9	2.5	1.5	1	10	3.5		PowerPAK SO-8
Si7872DP	30	12	0.022	0.028					11.5	3.8	3.5	1.8	0.8	10	3.5		PowerPAK SO-8
Si7880ADP	30	20	0.003	0.004				84	37	16.3	9.6	1.1	1	40	83		PowerPAK SO-8
Si7882DP	12	8		0.0055	0.008				21	4.6	3.5	1	0.6	22	5		PowerPAK SO-8
Si7884DP	40	20	0.007	0.0095					18.5	6	7.5	1	1	20	5.2		PowerPAK SO-8
Si7886ADP	30	12	0.004	0.0048					47	12.5	9	1	0.6	25	5.4		PowerPAK SO-8
Si7888DP	30	20	0.012	0.02					8.7	2.4	3.5	1	0.8	15.7	5		PowerPAK SO-8
Si7892BDP	30	20	0.0042	0.0057					27	11.4	8.1	1.2	1	25	5		PowerPAK SO-8
Si7894ADP	30	12	0.0036	0.0045					58	11.5	11.5	1	0.6	25	5.4		PowerPAK SO-8
Si7898DP	150	20	0.085	0.095				17		3.2	6	0.85	2	4.8	5	d	PowerPAK SO-8
Si7922DN	100	20	0.195	0.23				5.2		1.1	1.9	1.7	2.5	2.5	2.6	d	PowerPAK 1212-8
Si7940DP	12	8		0.017	0.025				11.5	3.2	2.5		0.6	11.8	3.5		PowerPAK SO-8
Si7942DP	100	20	0.049	0.06				16		3.8	5.5	2.2	2	5.9	3.5	d	PowerPAK SO-8
Si7946DP	150	20	0.15	0.168				12.6		2.8	4.5	3.5	2	3.3	3.5	d	PowerPAK SO-8

**Notes:** a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)  
b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)  
c.  $r_{DS} = r_{SS}/2$   
d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)  
f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)  
h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)  
i. Not used  
j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)  
k. S1 and D2 connected  
l. Not used

m. Schottky connected to channel 1  
n. Half-bridge  
o. Not used  
p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)  
q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)  
r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

# Power MOSFETs for DC/DC Applications

Vishay Siliconix



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
Si7956DP	150	20	0.105	0.115				17		3.9	5.5	2	2	4.1	3.5	d	PowerPAK SO-8
Si7970DP	40	20	0.019	0.026				23		4.4	5.6	2.3	1	10.2	3.5		PowerPAK SO-8
SiC711CD10	20			0.005												b	PowerPAK 10x10 MLF
SiC711CD10	20			0.0048												b	PowerPAK 10x10 MLF
SiC714CD10	20			0.01275											6	b	PowerPAK 10x10 MLF
SiC714CD10	20			0.0036											6	b	PowerPAK 10x10 MLF
SiE800DF	30	20	0.0072	0.0115				23	12	5.6	3	1.3	1.5	50	104		PolarPAK
SiE802DF	30	20	0.0019	0.0026				105	50	21	14	1.1	1.5	60	125		PolarPAK
SiE806DF	30	12	0.0017	0.0021				165	75	23	9.5	0.9	0.6	202	125		PolarPAK
SiE808DF	20	20	0.0016	0.0025				102	46	26	8	0.9	1.5	220	125		PolarPAK
SiE810DF	20	12		0.0016	0.0027			200	90	21	19	0.9	0.8	221	125		PolarPAK
SUB85N02-03	20	8		0.003	0.0034	0.0038			140	18	24		0.45	85	250		D <sup>2</sup> PAK (TO-263)
SUB85N02-06	20	12		0.006	0.009				65	13	14		0.6	85	120		D <sup>2</sup> PAK (TO-263)
SUD15N15-95	150	20	0.095	0.1				20						15	62	d	DPAK (TO-252)
SUD19N20-90	200	20	0.09	0.105				34		8	12		2	19	136	d	DPAK (TO-252)
SUD25N15-52	150	20	0.052	0.06				33		9	12		2	25	136	d	DPAK (TO-252)
SUD30N04-10	40	20	0.01	0.014				50		9	11		1	30	97		DPAK (TO-252)
SUD40N02-08	20	12		0.0085	0.014				26	5	7		0.6	40	71		DPAK (TO-252)
SUD40N06-25L	60	20	0.022	0.025				40		9	10		1	20	75		DPAK (TO-252)
SUD40N08-16	80	20	0.016					42		7	13		2	40	136		DPAK (TO-252)
SUD40N10-25	100	20	0.025	0.028				40		11	9		1	40	136		DPAK (TO-252)

- Notes:**
- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
  - b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
  - c.  $r_{DS} = r_{SS}/2$
  - d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
  - e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
  - f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
SUD50N02-04P	20	20	0.0043	0.006					40	14	13	1.6	0.8	34	136		DPAK (TO-252)
SUD50N02-06	20	12		0.006	0.009				65	13	14		0.6	30	100		DPAK (TO-252)
SUD50N02-06P	20	20	0.006	0.0095					19	7.5	6	1.5	0.8	50	65		DPAK (TO-252)
SUD50N02-09P	20	20	0.0095	0.017					10.5	4.2	4	4	0.8	20	39.5		DPAK (TO-252)
SUD50N02-11P	20	20	0.011	0.02					9.2	4	3	3.5	0.8	18	38		DPAK (TO-252)
SUD50N02-12P	20	20	0.012	0.026					7.5	3.5	2.6	3	0.8	40	33.3		DPAK (TO-252)
SUD50N024-06P	22	20	0.006	0.0095					19	7.5	6	1.5	0.8	80	65		DPAK (TO-252)
SUD50N024-09P	22	20	0.0095	0.017					10.5	4.2	4	4	0.8	49	39.5		DPAK (TO-252)
SUD50N025-05P	25	20	0.0052	0.0076				63	30	10.5	10.5	1	1.4	89	83		DPAK (TO-252)
SUD50N025-06P	25	20	0.0062	0.01				44	20.5	7.5	7	1.1	1.4	78	65		DPAK (TO-252)
SUD50N025-09BP	25	20	0.0086	0.012				38	18.5	7	6.5	0.9	1	62	55		DPAK (TO-252)
SUD50N03-06AP	30	20	0.0057	0.0078				62	30	11	9	0.9	1.2	90	83		DPAK (TO-252)
SUD50N03-09P	30	20	0.0095	0.014					11	7.5	5	2	1	63	65.2		DPAK (TO-252)
SUD50N03-12P	30	20	0.012	0.0175					13	6	5	1.5	1	47	46.8		DPAK (TO-252)
SUD50N03-16P	30	20	0.016	0.024					8.5	5	2.5	5.5	1	37	40.8		DPAK (TO-252)
SUD50N03-7m3P	30	12	0.0073	0.0087				34	15.7	6	2.2	1.3	0.75	50	65		DPAK (TO-252)
SUD50N06-07L	60	20	0.0074	0.0088				96		19	20	1.5	1	96	136		DPAK (TO-252)
SUM09N20-270	200	20	0.27	0.3				11		2.7	4	4	2	9	60	d	D <sup>2</sup> PAK (TO-263)
SUM100N12-14L	125	20	0.0144	0.0154				135	67	21	33	1.8	1	100	375		D <sup>2</sup> PAK (TO-263)

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
SUM110N02-03P	20	20	0.0032	0.0052					40	14	13	0.85	0.8	110	120		D <sup>2</sup> PAK (TO-263)
SUM110N03-03P	30	20	0.0026	0.004				172		40	22	1.3	1	110	375		D <sup>2</sup> PAK (TO-263)
SUM110N03-04P	30	20	0.0042	0.0065					40	18	16	1	1	110	120		D <sup>2</sup> PAK (TO-263)
SUM110N10-09	100	20	0.0095					110		24	24		2	110	437.5		D <sup>2</sup> PAK (TO-263)
SUM16N20-125	200	20	0.125	0.15				24		9	9	4	2	16	100	d	D <sup>2</sup> PAK (TO-263)
SUM23N15-73	150	20	0.073	0.077				22		6	7.5	4	2	23	100	d	D <sup>2</sup> PAK (TO-263)
SUM27N20-78	200	20	0.078	0.083				40		11	14	2	2	27	150	d	D <sup>2</sup> PAK (TO-263)
SUM34N10-35	100	20	0.035	0.04				35		10	10	4.5	2	34	100	d	D <sup>2</sup> PAK (TO-263)
SUM40N02-09P	20	20	0.0095	0.017					10.5	4.2	4	4	0.85	40	93		D <sup>2</sup> PAK (TO-263)
SUM40N02-12P	20	20	0.012	0.026					7.5	3.5	2.6	3	0.85	40	83		D <sup>2</sup> PAK (TO-263)
SUM40N15-38	150	20	0.038	0.042				38		13	13	2	2	40	166	d	D <sup>2</sup> PAK (TO-263)
SUM45N25-58	250	30	0.058	0.062				95		28	34	1.6	2	45	375	d	D <sup>2</sup> PAK (TO-263)
SUM55N03-16P	30	20	0.016	0.024				17		5	2.5	5.5	1	55	93		D <sup>2</sup> PAK (TO-263)
SUM60N10-17	100	20	0.0165	0.019				65		25	19	1.5	2	60	150	d	D <sup>2</sup> PAK (TO-263)
SUM65N20-30	200	20	0.03					90		23	34		2	65	375		D <sup>2</sup> PAK (TO-263)
SUM70N03-09CP	30	20	0.0095	0.014				31		7.5	5	1.5	1	70	93		D <sup>2</sup> PAK (TO-263)
SUM85N02-05P	20	20	0.005	0.0083					19	7.5	6	1.5	0.8	85	107		D <sup>2</sup> PAK (TO-263)
SUM85N03-06P	30	20	0.006	0.009				48		10	7.5	1.9	1	85	100		D <sup>2</sup> PAK (TO-263)
SUM85N03-07P	30	20	0.007	0.01					20	9	7	1.9	1	85	93		D <sup>2</sup> PAK (TO-263)

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
SUM85N03-08P	30	20	0.0075	0.0105					13	4.5	4	2	1	85	100		D <sup>2</sup> PAK (TO-263)
SUM85N15-19	150	20	0.019					76		21	26		2	85	375		D <sup>2</sup> PAK (TO-263)
SUP18N15-95	150	20	0.095	0.1				20						18	88	d	TO-220
SUP28N15-52	150	20	0.052	0.06				33		9	12		2	28	120	d	TO-220
SUP57N20-33	200	20	0.033					90		23	34		2	57	300		TO-220
SUP60N10-16L	100	20	0.016	0.018				73		15	20	1.5	1	60	150		TO-220
SUP70N03-09BP	30	20	0.009	0.013					15.5	5	6		0.8	70	93		TO-220
SUP80N15-20L	150	20	0.02	0.022				110		21	33	1.6	1	80	300		TO-220
SUP85N02-03	20	8		0.003	0.0034	0.0038			140	18	24		0.45	85	250		TO-220
SUP85N03-04P	30	20	0.004	0.007				71		15	16		1	85	166		TO-220
SUP85N03-07P	30	20	0.007	0.01				60		13	10		1	85	107		TO-220
SUP85N10-10	100	20	0.01	0.012				105		17	23		1	85	250		TO-220
SUP90P06-09L	-60	20	0.0093	0.0118				160		40	36	3	1	90	250		TO-220
SUR50N024-06P	22	20	0.006	0.0095					19	7.5	6	1.5	0.8	80	65		Reverse DPAK
SUR50N024-09P	22	20	0.0095	0.017					10.5	4.2	4	4	0.8	49	39.5		Reverse DPAK
SUR50N025-05P	25	20	0.0052	0.0076				63	30	10.5	10.5	1	1.4	89	83		Reverse DPAK
SUR50N025-06P	25	20	0.0062	0.01				44	20.5	7.5	7	1.1	1.4	78	65		Reverse DPAK
SUR50N025-09BP	25	20	0.0086	0.012				38	18.5	7	6.5	0.9	1.2	62	55		Reverse DPAK
SUR50N03-06AP	30	20	0.0057	0.0078				62	30	11	9	0.9	1.2	90	83		Reverse DPAK

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)

## Alphanumeric Index, continued

Part Number	$V_{DS}$ (V)	$V_{GS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )					$Q_g$ (nC)		$Q_{GS}$ (nC)	$Q_{GD}$ (nC)	$R_g$ Typ (W)	$V_{th}$ (V)	$I_D$ (A)	$P_D$ (W)	Footnote	Package
			$V_{GS} = 10V$	$V_{GS} = 4.5V$	$V_{GS} = 2.5V$	$V_{GS} = 1.8V$	$V_{GS} = 1.5V$	$V_{GS} = 10V$	$V_{GS} = 4.5V$								
SUR50N03-09P	30	20	0.0095	0.014					11	7.5	5	1.5	1	63	65.2		Reverse DPAK
SUR50N03-12P	30	20	0.012	0.0175					13	6	5	1.5	1	47	46.8		Reverse DPAK
SUR50N03-16P	30	20	0.016	0.024					8.5	5	2.5	5.5	1	36	40.8		Reverse DPAK
SUR50N06-07L	60	20	0.0074	0.0088				96		19	20	1.5	1	96	136		Reverse DPAK
SUU15N15-95	150	20	0.095	0.1				20		5.5	7		2	15	62	d	T0-251
SUU50N025-05P	25	20	0.0052	0.0076				63	30	10.5	10.5	1	1.4	89	83		T0-251
SUU50N025-06P	25	20	0.0062	0.01				44	20.5	7.5	7	1.1	1.4	78	65		T0-251
SUU50N025-09BP	25	20	0.0086	0.012				38	18.5	7	6.5	0.9	1.2	62	55		T0-251
SUU50N03-06AP	30	20	0.0057	0.0078				62	30	11	9	0.9	1.2	90	83		T0-251
SUU50N03-09P	30	20	0.0095	0.014					15	7.5	5	1.5	1	63	65.2		T0-251
SUU50N03-12P	30	20	0.012	0.0175				28		6	5	1.5	1	17.5	46.8		T0-251
SUU50N03-7m3P	30	12	0.0073	0.0087				34	15.7	6	2.2	1.3	0.75	50	65		T0-251
SUU50N06-07L	60	20	0.0074	0.0088				96		19	20	1.5	1	96	136		T0-251
SUV85N03-04P	30	20	0.0043	0.007				71		15	16	2.2	1	85	166		T0-262
SUV85N10-10	100	20	0.0105	0.012				105		17	23		1	85	250		T0-262
SUV90N06-05	60	20	0.0052	0.0072				155		28	44		1	90	350		T0-262

**Notes:**

- a.  $Q_g$  @  $V_{GS} = 15$  V (vs. 10 V)
- b.  $Q_g$  @  $V_{GS} = 5$  V (vs. 4.5 V)
- c.  $r_{DS} = r_{SS}/2$
- d.  $r_{DS(on)}$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- e.  $r_{DS(on)}$  @  $V_{GS} = 3$  V (vs. 3.3 V)
- f.  $r_{DS(on)}$  @  $V_{GS} = 3.7$  V (vs. 3.3 V)

- g.  $r_{DS(on)}$  @  $V_{GS} = 4.75$  V (vs. 4.5 V)
- h.  $r_{DS(on)}$  @  $V_{GS} = 2.7$  V (vs. 2.5 V or 3.3 V)
- i. Not used
- j.  $r_{DS(on)}$  @  $V_{GS} = 3.1$  V (vs. 3.3 V)
- k. S1 and D2 connected
- l. Not used

- m. Schottky connected to channel 1
- n. Half-bridge
- o. Not used
- p.  $r_{DS(on)}$  @  $V_{GS} = 3.6$  V (vs. 3.3 V)
- q.  $Q_g$  @  $V_{GS} = 6$  V (vs. 4.5 V)
- r.  $r_{DS(on)}$  @  $V_{GS} = 8$  V (vs. 4.5 V)



## PWM Controllers and Converters

Part Number	Package	Topology	Input Voltage (V)	Mode	Maximum Oscillator Frequency (MHz)	Reference Voltage (V)	Maximum Supply Current (mA)
Distributed Power							
Si9100*	PDIP-14 PLCC-20	Buck, Flyback, Forward	10 - 70	Current	1	4	1
Si9102*	PDIP-14 PLCC-20	Buck, Flyback, Forward	10 - 120	Current	1	4	1
Si9104*	SO-16WB	Buck, Flyback, Forward	10 - 120	Current	1	4	1
Si9105*	SO-16WB PDIP-14 PLCC-20	Buck, Flyback, Forward	10 - 120	Current	1	4	0.5
Si9108	SO-16WB PDIP-14 PLCC-20	Buck, Flyback, Forward	10 - 120	Current	1	4	0.5
Si9110	SO-14 PDIP-14	Buck, Flyback, Forward	10 - 120	Current	1	4	1
Si9111	SO-14 PDIP-14	Buck, Flyback, Forward	10 - 120	Current	1	4	1
Si9112	SO-14 PDIP-14	Buck, Flyback, Forward	10 - 120	Current	1	4	1
Si9113	SO-14	Buck, Flyback, Forward	23 - 200	Current	0.5	1.3	1.4
Si9114A	SP-14 PDIP-14	Buck, Flyback, Forward	15 - 200	Current	1	4	3
Si9117*	SO-16	Buck, Flyback, Forward	15 - 200	Current	1	4	4.5
Si9118	SO-16	Buck, Flyback, Forward	10 - 200	Current	1	4	2.5
Si9119	SO-16	Buck, Flyback, Forward	10 - 200	Current	1	4	2.5
Si9121-5*	SO-8	Buck/Boost Converter	-10 to -60	Current	0.11	1.25	1.5
Si9121-3.3*	SO-8	Buck/Boost Converter	-10 to -60	Current	0.11	1.25	1.5
Si9138	SSOP-28	Triple Output, individual On/Off Control Power Supply Controller	5.5 - 30	Current	0.33	3.3	1.8
Si9120	SO-16 PDIP-16	Buck, Flyback, Forward	15 - 450	Current	1	4	1.5
Si9122	TSSOP-20, MLP65-20 PowerPAK	Half-Bridge	12 - 72	Voltage	0.5	3.3	14
Si9122E	TSSOP-20, MLP65-20 PowerPAK	Half Bridge	36 - 75	Voltage	0.5	3.3	15
Si9122A	TSSOP-20, MLP65-20 PowerPAK	Half-Bridge	28 - 75	Voltage	0.5	3.3	15
SiP11203	MLP44-16 PowerPAK	Synchronous Rectifier Driver	null	Voltage	0.5	1.225	15.5

\* Converters, with integrated MOSFET

## PWM Controllers and Converters, continued

Part Number	Package	Topology	Input Voltage (V)	Mode	Maximum Oscillator Frequency (MHz)	Reference Voltage (V)	Maximum Supply Current (mA)
Distributed Power, continued							
SiP11204	MLP44-16 PowerPAK	Synchronous Rectifier Driver	null	Voltage	0.5	1.225	15.5
SiP2800	SO-8, TSSOP-8	Flyback/Forward	6 - 11	Current	1	5	Start-up current: 200 $\mu$ A, Operation current: 1 mA
SiP2801	SO-8, TSSOP-8	Flyback/Forward	6 - 11	Current	1	5	Start-up current: 200 $\mu$ A, Operation current: 1 mA
SiP2802	SO-8, TSSOP-8	Flyback/Forward	6 - 11	Current	1	5	Start-up current: 200 $\mu$ A, Operation current: 1 mA
SiP2803	SO-8, TSSOP-8	Flyback/Forward	5 - 11	Current	1	4	Start-up current: 200 $\mu$ A, Operation current: 1 mA
SiP2804	SO-8, TSSOP-8	Flyback/Forward	6 - 11	Current	1	5	Start-up current: 200 $\mu$ A, Operation current: 1 mA
SiP2805	SO-8, TSSOP-8	Flyback/Forward	5 - 11	Current	1	4	Start-up current: 200 $\mu$ A, Operation current: 1 mA
Computer Point-of-Use							
Si9140	SO-16	Buck	2.7 - 8	Voltage	2	1.5	1
Si9145	SO-16 TSSOP-16	Buck, Boost, Flyback, Forward	2.7 - 8	Voltage	2	1.5	1.4
Portable Computer							
Si786	SSOP-28	Dual Synchronous Buck	5.5 - 30	Current	0.3	3.3	1.6
Si9137	SSOP-28	Triple Output, Sequence Selectable Controller	5.5 - 30	Current	0.33	3.3	1.8
Si9138	SSOP-28	Triple Output	5.5 - 30	Current	0.3	3.3	1.8
Si9139	SSOP-28	Buck, Buck-Boost	4.5 - 30	Current	0.3	3.3	1.8



## MOSFET Drivers

Part Number	Function	Supply Voltage (V)	Output Drive Capacity (A)	Input Levels Requirements	Features	Package	Protection
Si9910	High Voltage MOSFET Driver	11 - 16 for Driver	1.0	12-V Logic	dV/dt, di/dt Control	PDIP-8, SO-8	Short Circuit, Under Voltage
Si9912	Half-Bridge MOSFET Driver	4.5 - 30	1.0	5 V, TTL/CMOS	Shutdown Quiescent Current	SO-8	Under Voltage, Shoot-through
Si9913	Half-Bridge MOSFET Driver	4.5 - 30	1.0	5 V, TTL/CMOS	Synchronous Switch Enable	SO-8	Under Voltage, Shoot-through
SiP41101	Half-Bridge MOSFET Driver	4.5 - 30	4.1	5 V, TTL/CMOS	Shutdown, Synchronous Switch Enable	TSSOP-16	Under Voltage, Shoot-through
SiP41103	Half-Bridge N-Ch MOSFET Driver for DC-DC Conversion	4.5 - 5.5	1.5	5V CMOS Compatible	Synchronous Rectifier Enable, Programmable Shoot-Through Protection	MLP33-10	Shoot-through, Undervoltage
SiP41104	Half-Bridge N-Ch MOSFET Driver for DC-DC Conversion	4.5 - 5.5	1.5	5V CMOS Compatible	Tri-Stateable Output Drivers	SO-8	Shoot-through, Undervoltage
SiP41105	Half-Bridge N-Ch MOSFET Driver for DC-DC Conversion	4.5 - 5.5	1.5	5V CMOS Compatible	Synchronous Rectifier Enable, Shutdown Input, Programmable Shoot-Through Protection	TSSOP-16 PowerPAK®	Shoot-through, Undervoltage
SiP41108	Half-Bridge N-Ch MOSFET Driver with Adjustable High Side Propagation Delay, Internal Bootstrap Diode and CMOS Logic	10.8 - 13.2	1.8	5 V CMOS Compatible	Synchronous MOSFET Disable, Shutdown Input, Adaptive Shoot-Through Protection	TSSOP-16 PPAK	Shoot-through, Undervoltage Lockout
SiP41109	Half-Bridge N-Ch MOSFET Driver for DC-DC Conversion	10.8 - 13.2	1.8	5 V CMOS Compatible	Adaptive Shoot-Through Protection, PWM With Tri-State Enable, Internal Bootstrap Diode	SO-8	Shoot-through, Undervoltage Lockout
SiP41110	Half-Bridge N-Ch MOSFET Driver for DC-DC Conversion	10.8 - 13.2	1.8	5 V CMOS Compatible	Adaptive Shoot-Through Protection, PWM With Tri-State Enable, Internal Bootstrap Diode	SO-8	Shoot-through, Undervoltage Lockout
SiP41111	75/2A Peak, Low Cost, High Frequency Half-Bridge Driver	9 - 14	2.0	5 V CMOS Compatible	Internal Bootstrap Diode, Low Power Consumption	SO-8, PowerPAK SO-8	Undervoltage