

Application Note

MOSFET Support and Training Tools



ABSTRACT

Explore all of the literature and tools needed to support power MOSFET designs.

Table of Contents

1 Understanding MOSFET Data Sheets	1
2 MOSFET Selection	2
3 MOSFET Resources	2
4 Technical Articles	3
5 Tools	3
6 Revision History	4

Trademarks

All trademarks are the property of their respective owners.

1 Understanding MOSFET Data Sheets

TI developed a six-part technical article series that discusses some of the fundamental parts of a MOSFET data sheet. Prefer watching a video? TI also created accompanying videos for this series.

Title	Description	Video
UIS/avalanche ratings	Learn how to interpret UIS/avalanche ratings on a MOSFET data sheet.	Watch video
Safe operating area (SOA) graph	Learn how to interpret SOA curves on a MOSFET data sheet.	Watch video
Continuous current ratings	Learn how MOSFET current ratings are not measured the way that parameters like RDS(ON) and gate charge are determined, but rather, they are calculated, and can be arrived at in many different ways.	Watch video
Pulsed current ratings	Learn how pulsed current ratings are calculated and how they are represented in the safe operating area graph on the FET data sheet.	-
Switching parameters	Learn about other miscellaneous switching parameters that appear in the MOSFET data sheet their relevance (or lack thereof) to overall device performance.	Watch video
Thermal impedance	Learn about the junction-to-ambient thermal impedance and junction-to-case thermal impedance parameters on a FET data sheet.	Watch video

2 MOSFET Selection

Articles providing guidance to select the correct FET for the application.

Technical Article Title	Description
Basic cross referencing	Learn the three basic steps to cross referencing your MOSFETs.
Motor control	Learn specific considerations to consider for FETs that can be used to drive a motor.
Switch mode power supply	Learn how to traverse an exhaustive list of SMPS topologies to find the correct MOSFET.
FET selection	Learn how to use TI's selection tool to select the correct FET for your design.
Load switching	Learn about the key considerations for using your MOSFET as a load switch.
Battery protection	Learn about how to select the correct MOSFET to use for battery protection.
Hot swap	Learn about how to select the correct MOSFET for hot swap.

3 MOSFET Resources

Application notes for proper usage of TI FETs.

Title	
QFN and SON PCB attachment	Read now
Ringing reduction techniques for NexFET™ high performance MOSFETs	Read now
FemtoFET surface mount guidelines	Read now
Design summary power block II	Read now
Power loss calculation with common source inductance consideration for synchronous buck converters	Read now
Semiconductor and IC package thermal metrics	Read now
DSBGA wafer level chip scale package	Read now
WCSP handling guide	Read now
Powerstack™ packaging technology overview	Read now

4 Technical Articles

Answers to common technical questions regarding TI FETs.

Title	Description
What does a "lead-free" power MOSFET really mean?	Learn about the nuances in the terminology <i>lead free</i> and what you need to actually be looking for.
Choosing the right SOA for your design: discrete FETs vs. power blocks	Learn the differences in how TI specifies SOA for single, discrete FETs vs. integrated power blocks.
FemtoFET™ MOSFETs: small as sand but it's all about that pitch	Learn about the key benefits of our small FemtoFET™ MOSFETs.
Shrink your industrial footprint with 60V FemtoFET™ MOSFET	Learn how a the 60V FemtoFET can save space in a design
Improve the performance of your power tool design with power blocks	Learn how a MOSFET power block helps to achieve a more reliable, smaller-sized, efficient and cost-competitive system design.
MOSFET pair the size of a flake of pepper?	Learn how ultra-thin Power Block II devices allow products to become dense, while consuming less power and dissipating less heat.
Selecting the right power MOSFET/power block package for your application	Learn about package thermal capability and power dissipation in TI MOSFET and power block packages.
What type of ESD protection does your MOSFET include?	Learn the differences in ESD protections to prevent unwanted MOSFET failures, plus key design considerations for different ESD structures.
What's not in the power MOSFET data sheet, part 1: temperature dependency	Learn about what is in a MOSFET data sheet and more importantly, what's not.
What's not in the power MOSFET data sheet, part 2: voltage-dependent leakage currents	Learn about voltage-dependent leakage currents not included in the MOSFET data sheet.
Tips for successfully paralleling power MOSFETs	Learn tips on what to do when paralleling MOSFET devices
Solving Assembly Issues with Chip Scale Power MOSFETs	Learn how to resolve issues assembling TI chip scale MOSFETs
Using MOSFET SOA curves in your design	Learn to use SOA curves in a design
Power MOSFET Body Diode Current Carrying Capability	Learn how to calculate MOSFET body diode current capability

5 Tools

Application specific tools to analyze, compare, and select TI FETs.

Tool Name	
MOSFET power loss calculator for synchronous buck converter applications	View tool
MOSFET power loss calculator for non-synchronous boost converter	View tool
MOSFET power loss calculator for synchronous boost converter	View tool
MOSFET power loss calculator for load switch applications	View tool
MOSFET power loss calculator for motor drive applications	View tool
MOSFET power loss calculator for synchronous rectifier	View tool
MOSFET power loss calculator for inverting buck boost	View tool
MOSFET power loss calculator for FOC motor drive	View tool
LM25066 Design Calculator With FET Recommendation	Download tool
LM5066I Design Calculator With FET Recommendation	Download tool
LM5069 Design Calculator With FET Recommendation	Download tool
MOSFET SOA selection tool	Download tool

6 Revision History

Changes from Revision E (May 2024) to Revision F (June 2024) Page

- Updated *MOSFET power loss calculator for synchronous rectifier* hyperlink.....3
-

Changes from Revision D (April 2024) to Revision E (May 2024) Page

- Updated technical article hyperlinks..... 1
 - Updated hyperlinks to several publications..... 2
 - Updated hyperlinks to several publications..... 3
-

Changes from Revision C (November 2023) to Revision D (April 2024) Page

- Updated technical article hyperlinks..... 1
-

Changes from Revision B (March 2023) to Revision C (November 2023) Page

- Added *Learn how to calculate MOSFET body diode current capability* application note..... 3
-

Changes from Revision A (November 2022) to Revision B (March 2023) Page

- Updated the numbering format for tables, figures, and cross-references throughout the document..... 1
 - Added *Using MOSFET SOA curves in your design* application note..... 3
-

Changes from Revision * (September 2022) to Revision A (November 2022) Page

- Added *Solving Assembly Issues with Chip Scale Power MOSFETs* application note.....3
 - Added MOSFET power loss calculator for FOC motor drive Design Calculator..... 3
-

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2024, Texas Instruments Incorporated