

# FDD6630A Datasheet



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DiGi Electronics Part Number	FDD6630A-DG
Manufacturer	<a href="#">onsemi</a>
Manufacturer Product Number	FDD6630A
Description	MOSFET N-CH 30V 21A TO252
Detailed Description	N-Channel 30 V 21A (Ta) 28W (Ta) Surface Mount T O-252AA



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## Purchase and inquiry

Manufacturer Product Number:

FDD6630A

Series:

PowerTrench®

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

30 V

Drive Voltage (Max Rds On, Min Rds On):

4.5V, 10V

Vgs(th) (Max) @ Id:

3V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 175°C (Tj)

Supplier Device Package:

TO-252AA

Base Product Number:

FDD6630

Manufacturer:

onsemi

Product Status:

Obsolete

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

21A (Ta)

Rds On (Max) @ Id, Vgs:

35mOhm @ 7.6A, 10V

Gate Charge (Qg) (Max) @ Vgs:

7 nC @ 5 V

Input Capacitance (Ciss) (Max) @ Vds:

462 pF @ 15 V

Power Dissipation (Max):

28W (Ta)

Mounting Type:

Surface Mount

Package / Case:

TO-252-3, DPAK (2 Leads + Tab), SC-63

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



ON Semiconductor®

# FDD6630A

## 30V N-Channel PowerTrench<sup>®</sup> MOSFET

### General Description

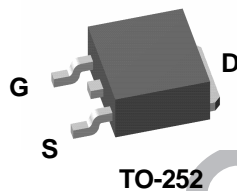
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

### Applications

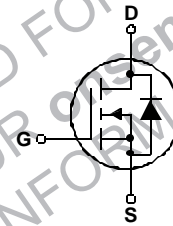
- DC/DC converter
- Motor drives

### Features

- 21 A, 30 V  $R_{DS(ON)} = 35 \text{ m}\Omega @ V_{GS} = 10 \text{ V}$   
 $R_{DS(ON)} = 50 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$
- Low gate charge (5nC typical)
- Fast switching
- High performance trench technology for extremely low  $R_{DS(ON)}$



TO-252



### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rated	Units
$V_{DSS}$	Drain-Source Voltage	30	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_b$	Drain Current – Continuous	21	A
	– Pulsed	100	
$P_D$	Power Dissipation	28	W
		3.2	
		1.3	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	$-55$ to $+175$	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	4.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	40	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1b)	96	$^\circ\text{C/W}$

### Package Marking and Ordering Information

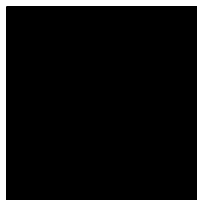
Device Marking	Device	Reel Size	Tape width	Quantity
FDD6630A	FDD6630A	13"	16mm	2500 units

**Electrical Characteristics** $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Drain-Source Avalanche Ratings (Note 2)</b>						
$W_{DSS}$	Drain-Source Avalanche Energy	Single Pulse, $V_{DD} = 15\text{ V}$			55	mJ
$I_{AR}$	Drain-Source Avalanche Current				7.6	A
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		23		mV/ $^\circ\text{C}$
$I_{BSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}$ , $V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage, Forward	$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate-Body Leakage, Reverse	$V_{GS} = -20\text{ V}$ , $V_{DS} = 0\text{ V}$			-100	nA
<b>On Characteristics (Note 2)</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	1	1.7	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		-4		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 7.6\text{ A}$ $V_{GS} = 4.5\text{ V}$ , $I_D = 6.3\text{ A}$ $V_{GS} = 10\text{ V}$ , $I_D = 7.6\text{ A}$ , $T_J = 125^\circ\text{C}$		28 40 44	35 50 58	m $\Omega$
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 5\text{ V}$	20			A
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{ V}$ , $I_D = 7.6\text{ A}$		13		S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$		462		pF
$C_{oss}$	Output Capacitance			113		pF
$C_{rss}$	Reverse Transfer Capacitance			40		pF
<b>Switching Characteristics (Note 2)</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{ V}$ , $I_D = 1\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\ \Omega$		5	11	ns
$t_r$	Turn-On Rise Time			8	17	ns
$t_{d(off)}$	Turn-Off Delay Time			17	28	ns
$t_f$	Turn-Off Fall Time			13	24	ns
$Q_g$	Total Gate Charge	$V_{DS} = 15\text{ V}$ , $I_D = 7.6\text{ A}$ , $V_{GS} = 5\text{ V}$		5	7	nC
$Q_{gs}$	Gate-Source Charge			2		nC
$Q_{gd}$	Gate-Drain Charge			1.4		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current				2.7	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 2.7\text{ A}$ (Note 2)		0.8	1.2	V

**Notes:**

1.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a)  $R_{\theta JA} = 40^\circ\text{C/W}$  when mounted on a  
1in<sup>2</sup> pad of 2 oz copper



b)  $R_{\theta JA} = 96^\circ\text{C/W}$  when mounted  
on a minimum pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%

3. Maximum current is calculated as: 
$$I_{D(max)} = \sqrt{\frac{P_D}{R_{DS(on)}}}$$
 where  $P_D$  is maximum power dissipation at  $T_C = 25^\circ\text{C}$  and  $R_{DS(on)}$  is at  $T_{J(max)}$  and  $V_{GS} = 10\text{ V}$ . Package current limitation is 21A

Typical Characteristics

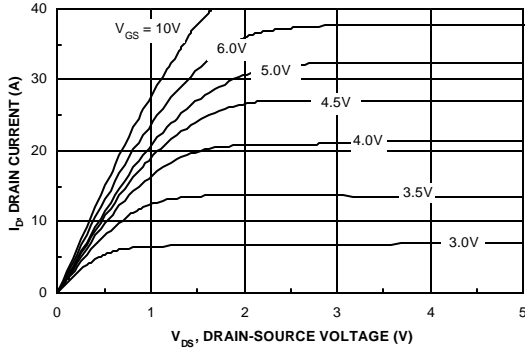


Figure 1. On-Region Characteristics.

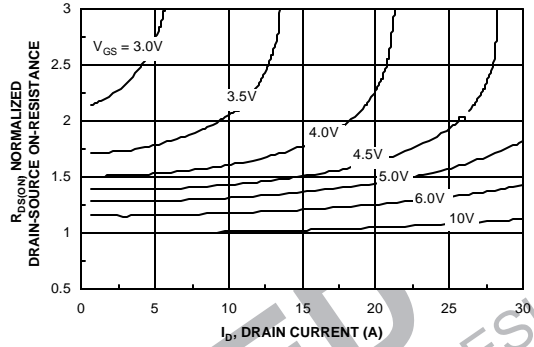


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

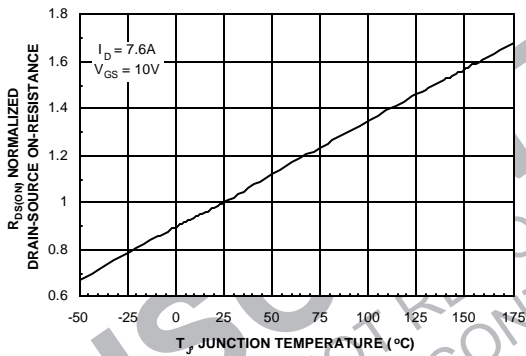


Figure 3. On-Resistance Variation with Temperature.

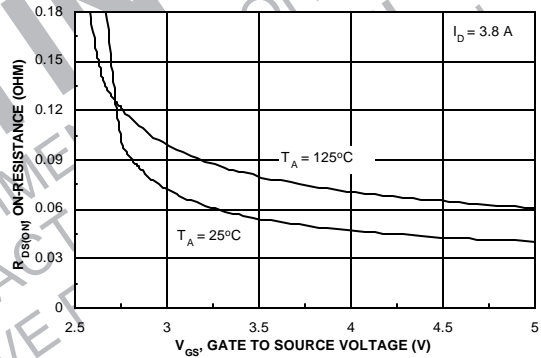


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

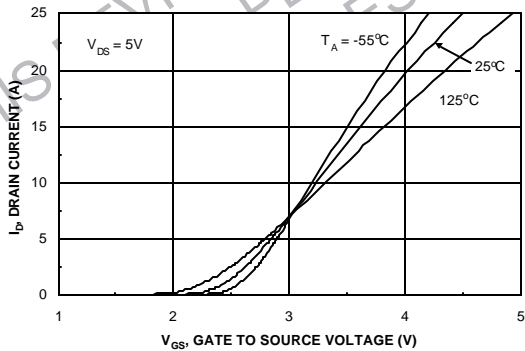


Figure 5. Transfer Characteristics.

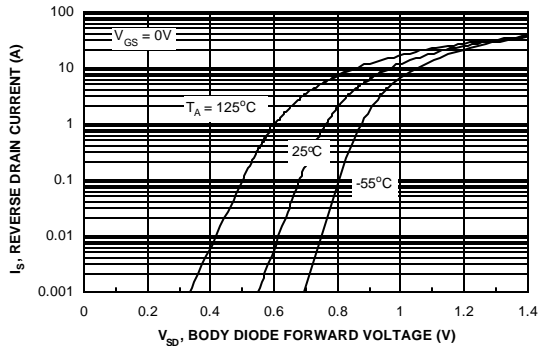


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

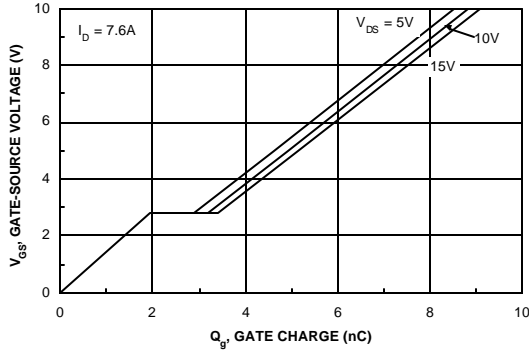


Figure 7. Gate Charge Characteristics.

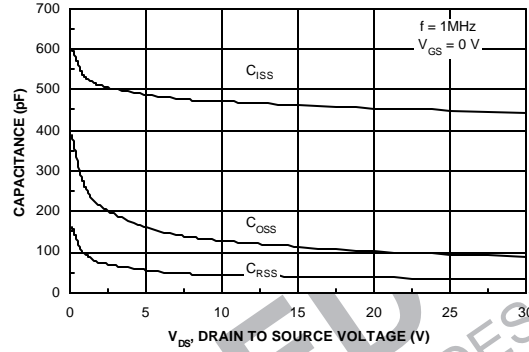


Figure 8. Capacitance Characteristics.

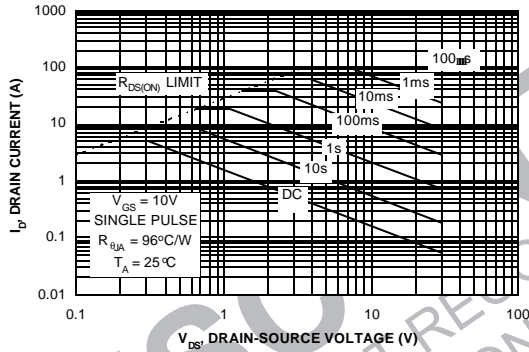


Figure 9. Maximum Safe Operating Area.

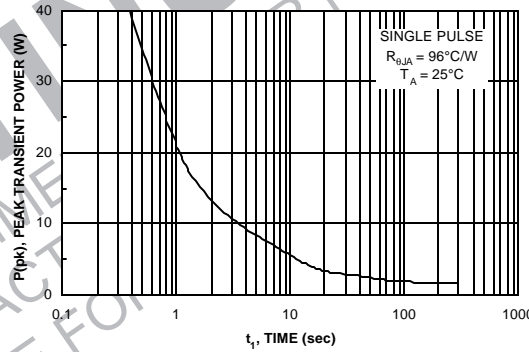


Figure 10. Single Pulse Maximum Power Dissipation.

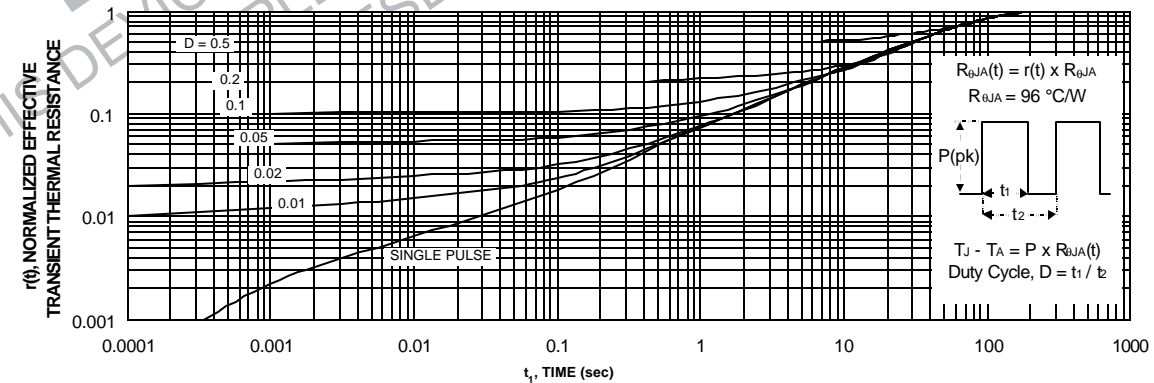



Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

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