



FDS4672A

40V N-Channel PowerTrench® 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 $R_{\text{DS(ON)}}$ and fast switching speed.

Applications

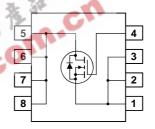
DC/DC converter

Features

- 11 A, 40 V. $R_{DS(ON)} = 13 \text{ m}\Omega$ @ $V_{GS} = 4.5 \text{ V}$
- High performance trench technology for extremely low $R_{\mbox{\scriptsize DS(ON)}}$
- Low gate charge (35 nC typical)
- High power and current handling capability
- RoHS Compliant







Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V _{DSS}	Drain-Source Voltage		40	V
V _{GSS}	Gate-Source Voltage		±12	V
I _D	Drain Current - Continuous	(Note 1a)	11	Α
	- Pulsed		50	
E _{AS}	Single Pulse Avalanche Energy	(Note 3)	181	mJ
P _D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.4	
		(Note 1c)	1.2	
T _J , T _{STG}	Operating and Storage Junction Temperature Range		-55 to +175	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	25	°C/W

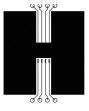
Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDS4672A	FDS4672A	13"	12mm	2500 units

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics					•
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	40			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		37		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32 \text{ V}, V_{GS} = 0 \text{ V}$			1	μА
I_{GSSF}	Gate-Body Leakage, Forward	V _{GS} = 12 V, V _{DS} = 0 V			100	nA
I_{GSSR}	Gate-Body Leakage, Reverse	$V_{GS} = -12 \text{ V } V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	0.8	1.2	2.0	V
$\Delta V_{GS(th)}$ ΔT_J	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		-4		mV/°C
R _{DS(on)}	Static Drain–Source On–Resistance	$V_{GS} = 4.5 \text{ V}, I_D = 11 \text{ A}$ $V_{GS} = 4.5 \text{ V}, I_D = 11 \text{ A}, T_J = 125 ^{\circ}\text{C}$		10 15	13 21	mΩ
I _{D(on)}	On-State Drain Current	V _{GS} = 4.5 V, V _{DS} = 5 V	50			Α
g _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 11 A		65		S
Dynamic	Characteristics		4			
C _{iss}	Input Capacitance	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V},$	J. /10	4766		pF
Coss	Output Capacitance	f = 1.0 MHz	~	346		pF
C _{rss}	Reverse Transfer Capacitance	20 %		155		pF
Switchir	g Characteristics (Note 2)	4 132 01				
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 20 \text{ V}, I_D = 1 \text{ A},$		17	31	ns
t _r	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, R_{GEN} = 6 \Omega$		9	18	ns
t _{d(off)}	Turn-Off Delay Time			43	68	ns
t _f	Turn-Off Fall Time			14	25	ns
Q_g	Total Gate Charge	$V_{DS} = 20 \text{ V}, I_{D} = 11 \text{ A},$		35	49	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 4.5 \text{ V}$		7.8		nC
Q_{gd}	Gate-Drain Charge			8.8		nC
Drain-S	ource Diode Characteristics a	and Maximum Ratings				
I _s	Maximum Continuous Drain-Source D				2.1	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 2.1 \text{ A} \text{(Note 2)}$		0.7	1.2	V

Notes:

^{1.} R_{aJA} 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_{aJC} is guaranteed by design while R_{aCA} is determined by the user's board design.



a) 50°C/W when mounted on a 1in² pad of 2 oz copper



b) 105°C/W when mounted on a .04 in² pad of 2 oz copper



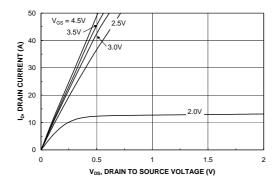
c) 125°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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

3.Starting $T_J = 25^{\circ}C$, L = 3mH, $I_D = 11A$, $V_{DD} = 40V$, $V_{GS} = 10V$

Typical Characteristics

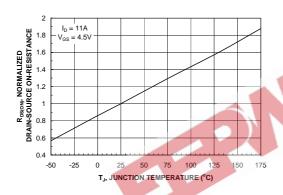


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Figure 1. On-Region Characteristics.

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



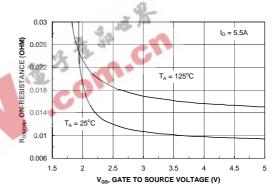
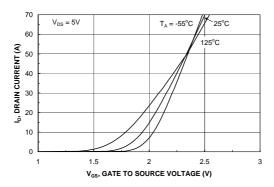


Figure 3. On-Resistance Variation with Temperature.

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



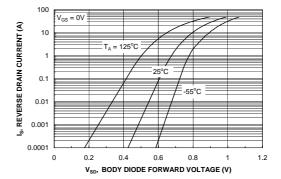
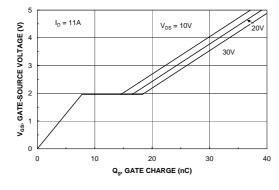


Figure 5. Transfer Characteristics.

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

Typical Characteristics



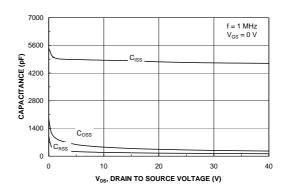
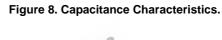
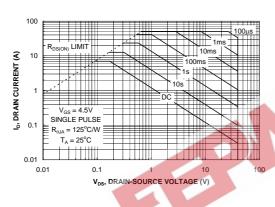


Figure 7. Gate Charge Characteristics.





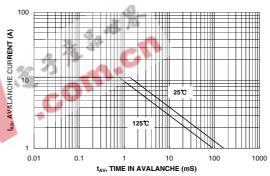
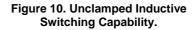


Figure 9. Maximum Safe Operating Area.



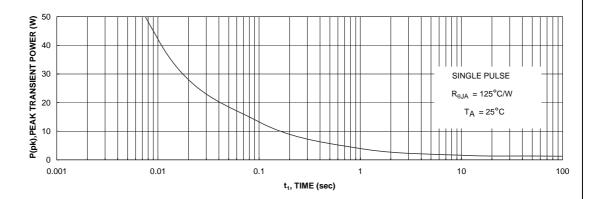


Figure 11 Single Pulse Maximum Power Dissipation.

Typical Characteristics

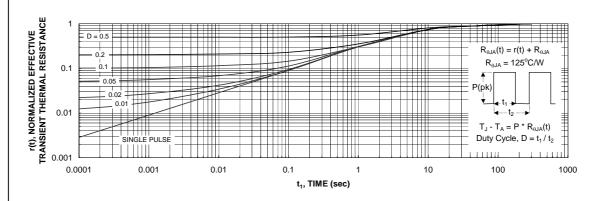


Figure 12. Transient Thermal Response Curve.

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