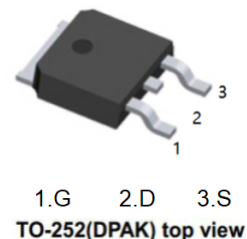


General Description

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.

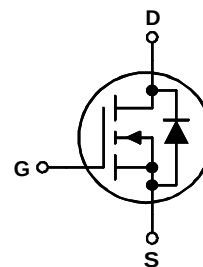


Application

- Vcore DC-DC for Desktop Computers and Servers
- VRM for Intermediate Bus Architecture

Features

- $V_{DS}(V) = 25V$
- $I_D = 17.7A$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 7.5m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 17m\Omega$ ($V_{GS} = 4.5V$)



MOSFET Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	25	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current -Continuous (Package limited) $T_C = 25^\circ C$	30	A
	-Continuous (Silicon limited) $T_C = 25^\circ C$	54	
	-Continuous $T_A = 25^\circ C$ (Note 1a)	17.7	
	-Pulsed	100	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	32	mJ
P_D	Power Dissipation $T_C = 25^\circ C$	39	W
	Power Dissipation $T_A = 25^\circ C$ (Note 1a)	3.7	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175	$^\circ C$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.8	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	40	

Electrical Characteristics T_j = 25 °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV _{DSS}	Drain to Source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0 V	25			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, referenced to 25 °C		16		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
I _{GSS}	Gate to Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
V _{GS(th)}	Gate to Source Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μA	1.0	1.9	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I _D = 250 μA, referenced to 25 °C		-6		mV/°C
r _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 17.7 A		5.8	7.5	mΩ
		V _{GS} = 4.5 V, I _D = 13.2 A		12.6	17.0	
g _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 17.7 A		84		S
C _{iss}	Input Capacitance	V _{DS} = 13 V, V _{GS} = 0 V, f = 1 MHz		1120	1490	pF
C _{oss}	Output Capacitance			238	320	pF
C _{rss}	Reverse Transfer Capacitance			221	335	pF
R _g	Gate Resistance			0.9		Ω
t _{d(on)}	Turn-On Delay Time	V _{DD} = 13 V, I _D = 17.7 A, V _{GS} = 10 V, R _{GEN} = 6 Ω		8	16	ns
t _r	Rise Time			5	10	ns
t _{d(off)}	Turn-Off Delay Time			18	33	ns
t _f	Fall Time			3	10	ns
Q _g	Total Gate Charge	V _{GS} = 0 V to 10 V		20	29	nC
Q _g	Total Gate Charge	V _{GS} = 0 V to 5 V		12	17	nC
Q _{gs}	Gate to Source Charge	V _{DD} = 13 V, I _D = 17.7 A		3.5		nC
Q _{gd}	Gate to Drain "Miller" Charge			4.9		nC
V _{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _S = 3.1 A (Note 2)		0.8	1.2	V
		V _{GS} = 0 V, I _S = 17.7 A (Note 2)		0.9	1.3	
t _{rr}	Reverse Recovery Time	I _F = 17.7 A, di/dt = 100 A/μs		17	31	ns
Q _{rr}	Reverse Recovery Charge			5	10	nC

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

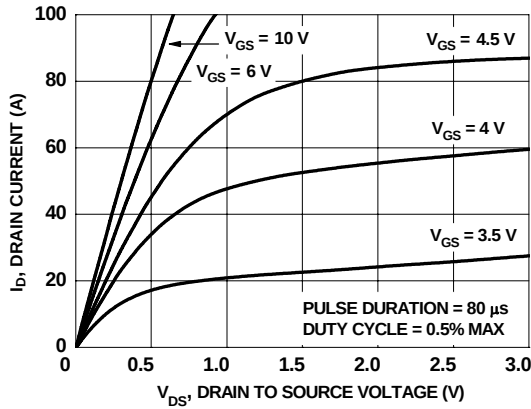


Figure 1. On-Region Characteristics

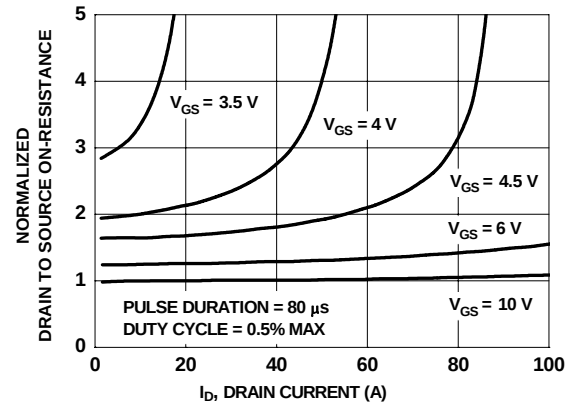


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

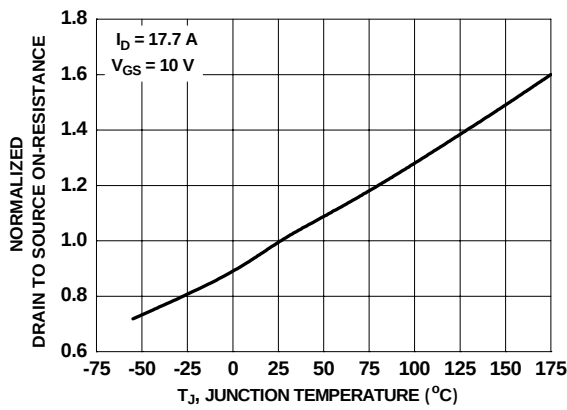


Figure 3. Normalized On-Resistance vs Junction Temperature

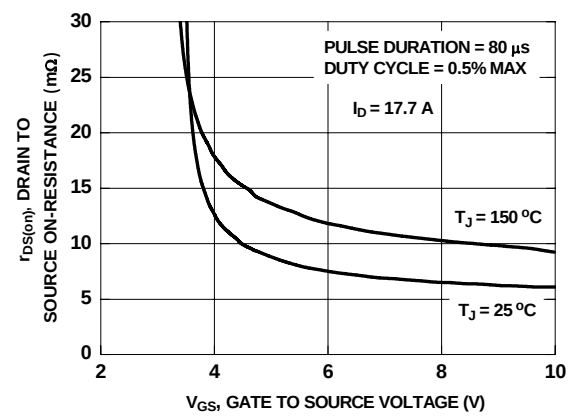


Figure 4. On-Resistance vs Gate to Source Voltage

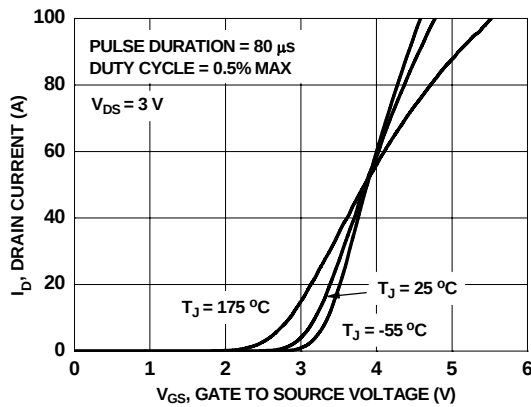


Figure 5. Transfer Characteristics

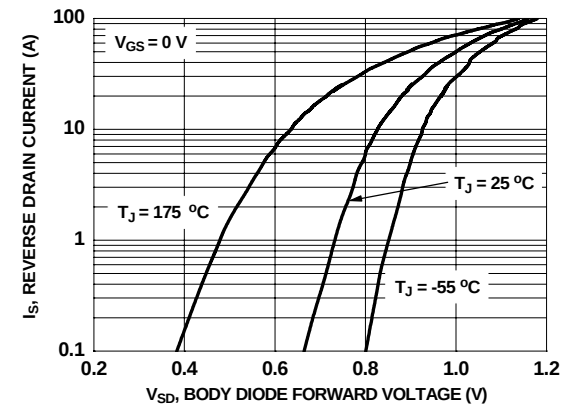


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

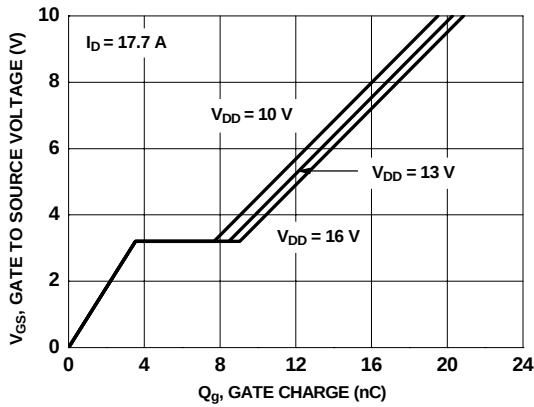


Figure 7. Gate Charge Characteristics

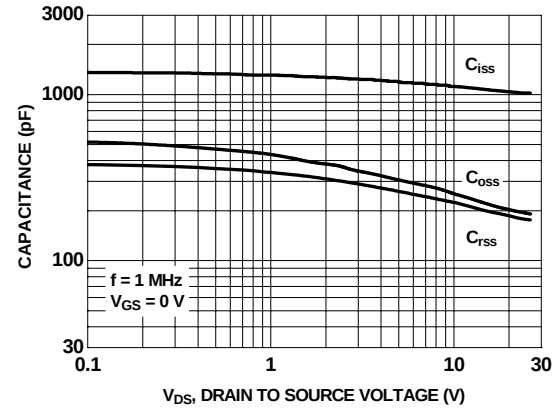


Figure 8. Capacitance vs Drain to Source Voltage

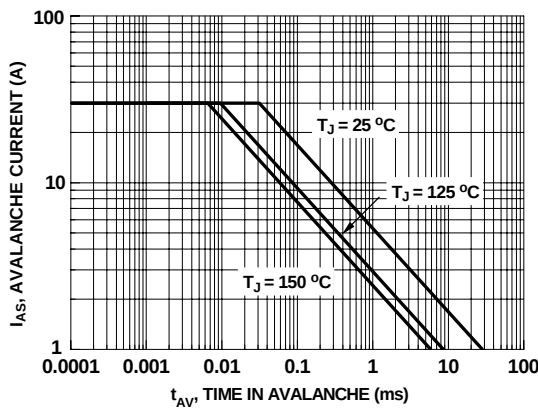


Figure 9. Unclamped Inductive Switching Capability

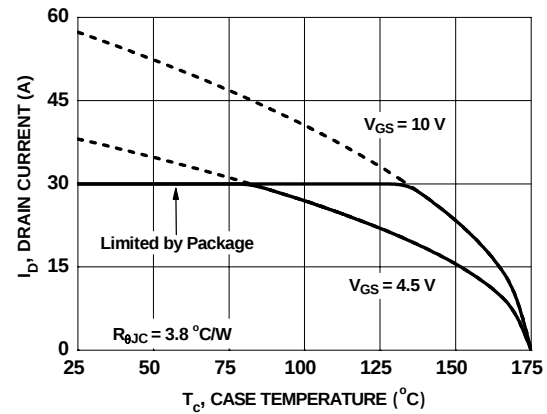


Figure 10. Maximum Continuous Drain Current vs Case Temperature

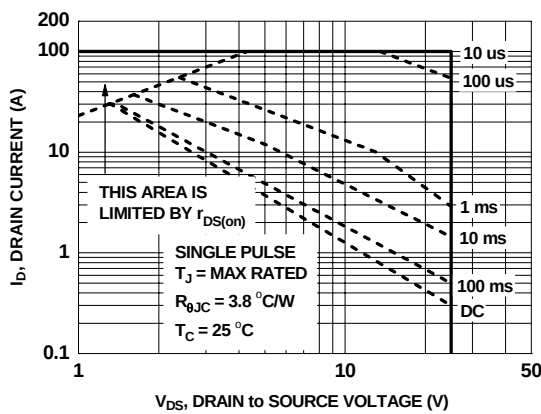


Figure 11. Forward Bias Safe Operating Area

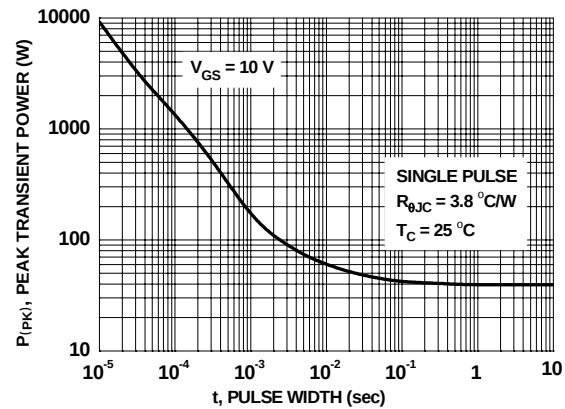


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

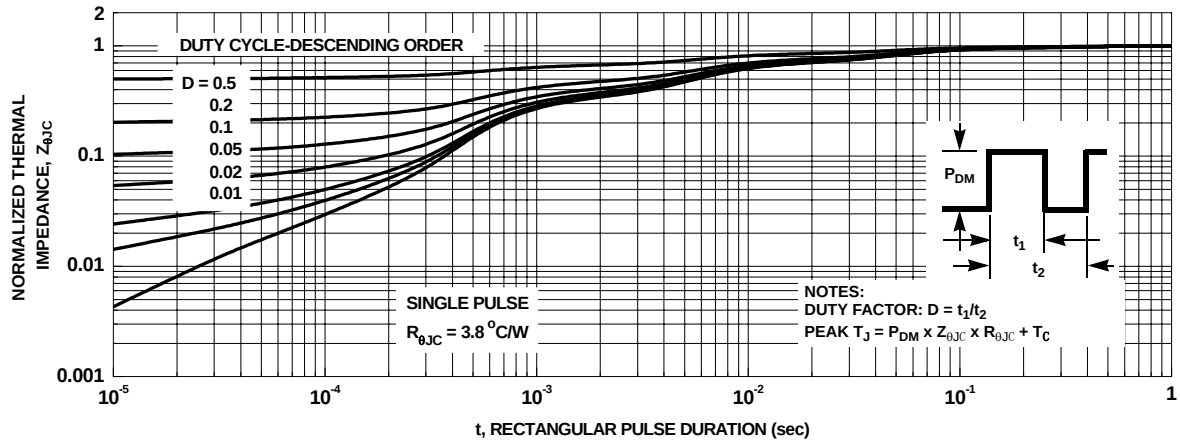


Figure 13. Transient Thermal Response Curve

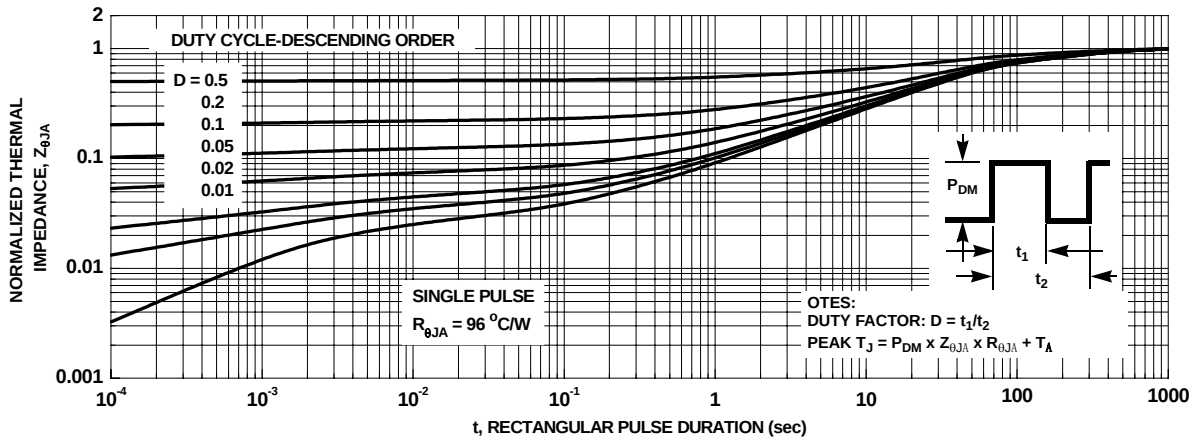
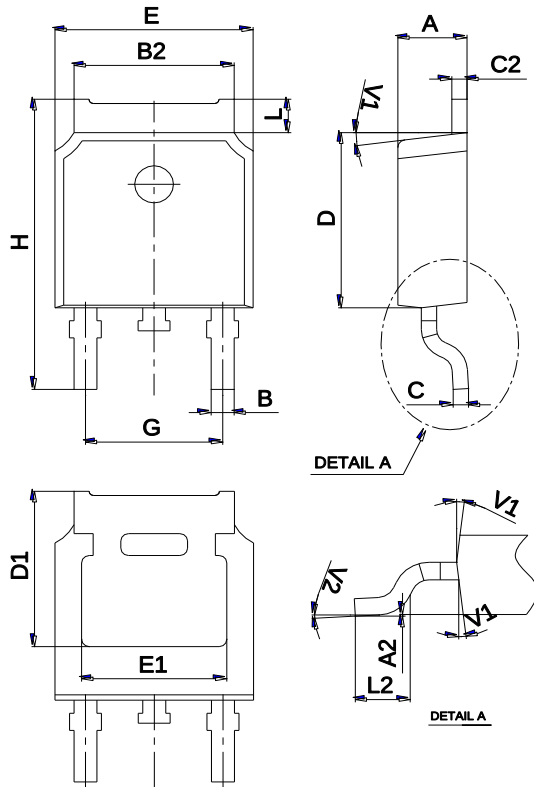


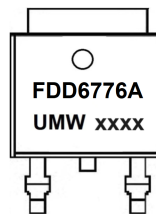
Figure 14. Transient Thermal Response Curve

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDD6776A	TO-252	2500	Tape and reel