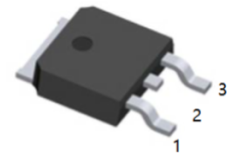


General Description

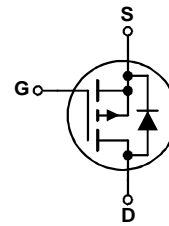
This P-Channel MOSFET has been optimized for power management applications requiring a wide range of gate drive voltage ratings (4.5V – 25V).



1.G 2.D 3.S
TO-252(DPAK) top view

Features

- $V_{DS} (V) = -30V$
- $R_{DS(ON)} < 26 m\Omega$ ($V_{GS} = -4.5V$)
- $R_{DS(ON)} < 34 m\Omega$ ($V_{GS} = -2.5V$)
- Fast switching speed
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	-30	V
V_{GSS}	Gate-Source Voltage	± 25	V
I_D	Continuous Drain Current @ $T_C=25^\circ C$ (Note 3) @ $T_A=25^\circ C$ (Note 1a) Pulsed, $PW \leq 100\mu s$ (Note 1b)	-40	A
		-11	
		-100	
P_D	Power Dissipation for Single Operation (Note 1) (Note 1a) (Note 1b)	52	W
		3.8	
		1.6	
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 (Note 1)	2.9	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	40	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1b)	96	$^\circ C/W$

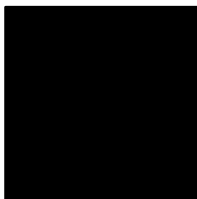
Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Drain-Source Avalanche Ratings (Note 4)						
E _{AS}	Single Pulse Drain-Source Avalanche Energy	I _D = -11 A		42		mJ
I _{AS}	Maximum Drain-Source Avalanche Current			-11		A
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = -250 μA	-30			V
ΔBV _{DSS} ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = -250 μA, Referenced to 25°C		-24		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -24 V, V _{GS} = 0 V			-1	μA
I _{GSS}	Gate-Body Leakage	V _{GS} = ±25V, V _{DS} = 0 V			±100	nA
On Characteristics (Note 2)						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250 μA	-1	-1.8	-3	V
ΔV _{GS(th)} ΔT _J	Gate Threshold Voltage Temperature Coefficient	I _D = -250 μA, Referenced to 25°C		5		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = -4.5 V, I _D = -11 A V _{GS} = -2.5 V, I _D = -9 A		22 28	26 34	mΩ
I _{D(on)}	On-State Drain Current	V _{GS} = -10 V, V _{DS} = -5 V	-20			A
g _{FS}	Forward Transconductance	V _{DS} = -5 V, I _D = -11 A		26		S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -15 V, V _{GS} = 0 V,		1715		pF
C _{oss}	Output Capacitance	f = 1.0 MHz		440		pF
C _{rss}	Reverse Transfer Capacitance			225		pF
R _G	Gate Resistance	V _{GS} = 15 mV, f = 1.0 MHz		3.6		Ω
Switching Characteristics (Note 2)						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -15 V, I _D = -1 A,		17	31	ns
t _r	Turn-On Rise Time	V _{GS} = -10 V, R _{GEN} = 6 Ω		11	21	ns
t _{d(off)}	Turn-Off Delay Time			43	68	ns
t _f	Turn-Off Fall Time			21	34	ns
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -11 A,		17	24	nC
Q _{gs}	Gate-Source Charge	V _{GS} = -5 V		9		nC
Q _{gd}	Gate-Drain Charge			4		nC
Drain-Source Diode Characteristics and Maximum Ratings						
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -3.2 A (Note 2)		-0.8	-1.2	V
T _{rr}	Diode Reverse Recovery Time	I _F = -11 A,		26		ns
Q _{rr}	Diode Reverse Recovery Charge	diF/dt = 100 A/μs		13		nC

Notes:

- R_{θJA} 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_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



a) R_{θJA} = 40°C/W when mounted on a 1 in² pad of 2 oz copper



b) R_{θJA} = 96°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

3. Maximum current is calculated as: $I_{AS} = \sqrt{\frac{P_D}{R_{DS(on)}}}$

where P_D is maximum power dissipation at T_C = 25°C and R_{DS(on)} is at T_{J(max)} and V_{GS} = 10V.

4. Starting T_J = 25°C, L = 0.69mH, I_{AS} = -11A

Typical Characteristics

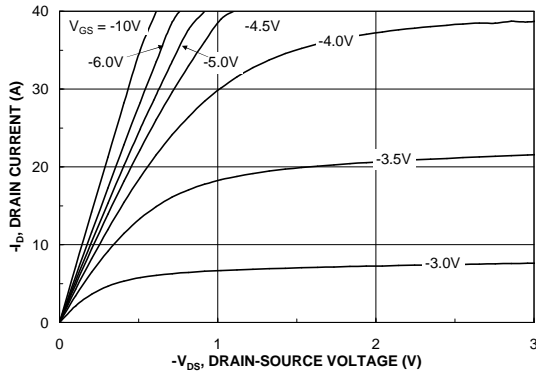


Figure 1. On-Region Characteristics.

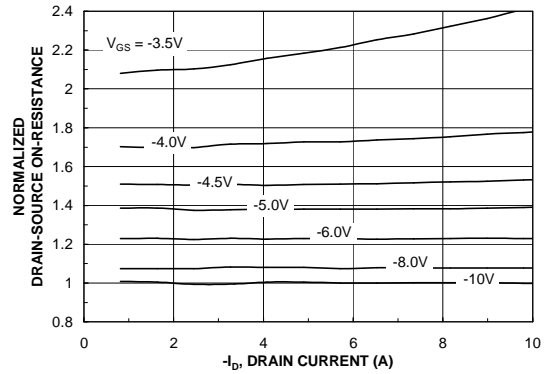


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

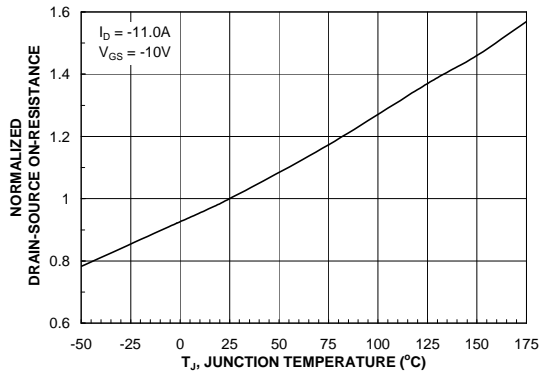


Figure 3. On-Resistance Variation with Temperature.

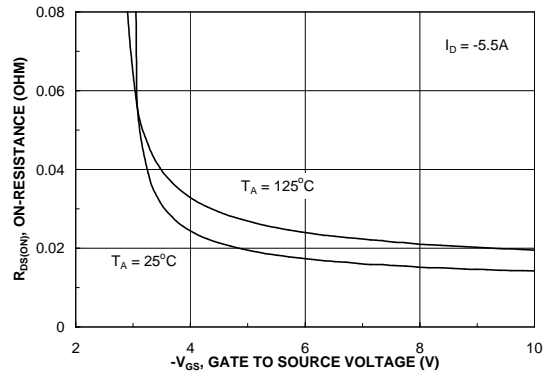


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

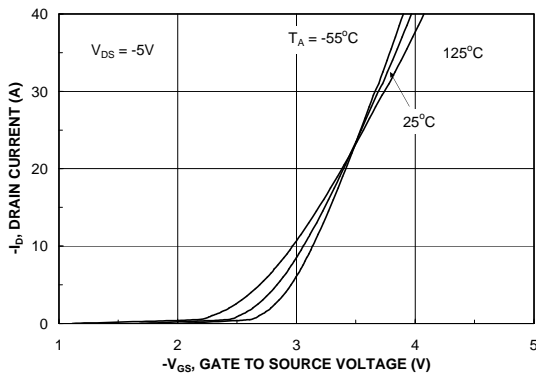


Figure 5. Transfer Characteristics.

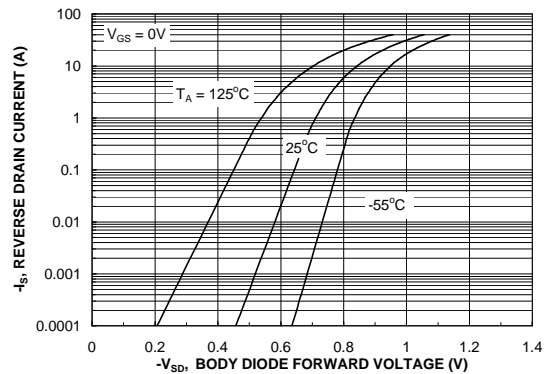


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

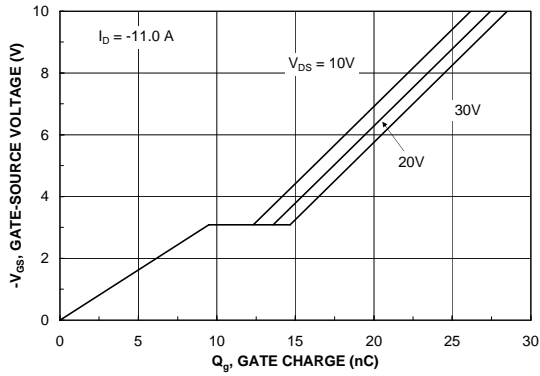


Figure 7. Gate Charge Characteristics.

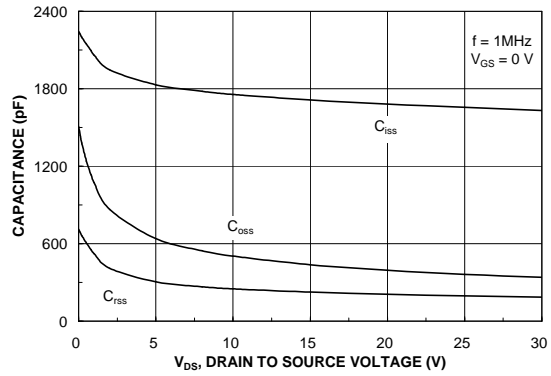


Figure 8. Capacitance Characteristics.

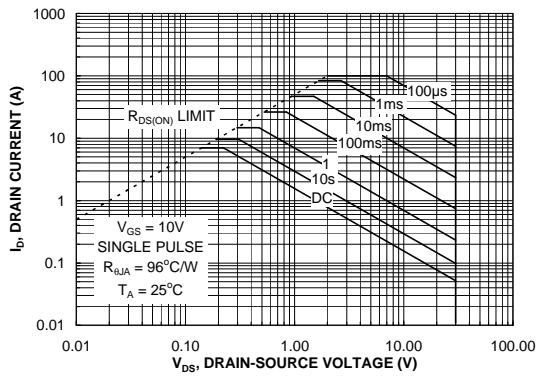


Figure 9. Maximum Safe Operating Area.

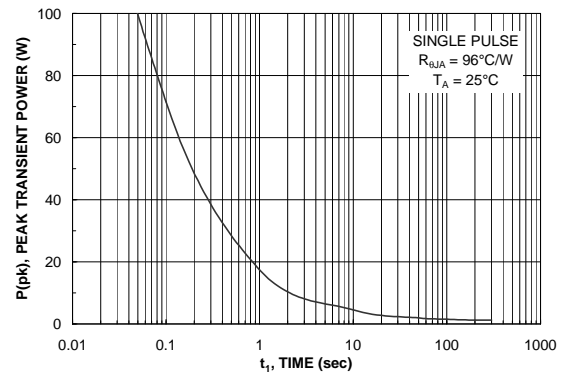


Figure 10. Single Pulse Maximum Power Dissipation.

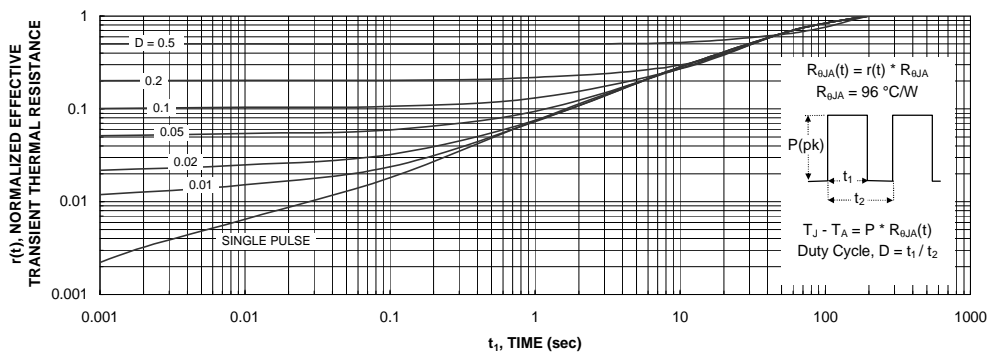
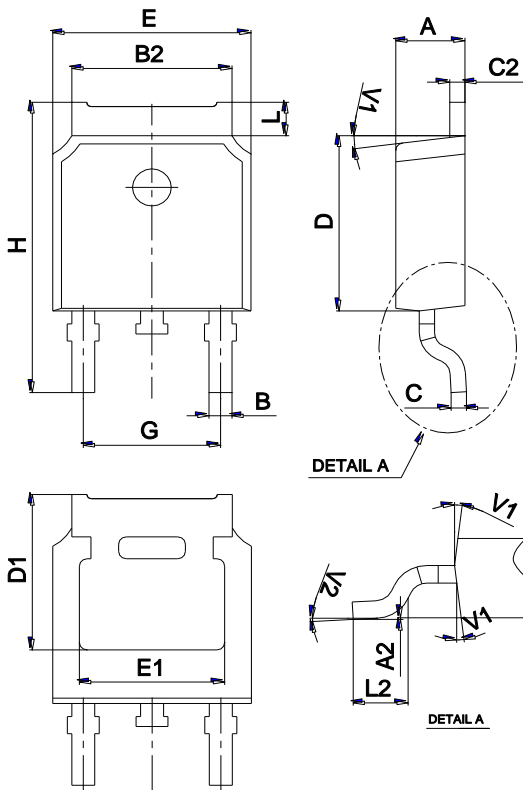


Figure 11. Transient Thermal Response Curve.

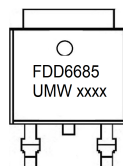
Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

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 FDD6685	TO-252	2500	Tape and reel