UDF®
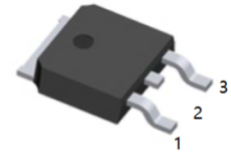
Features

- $V_{DS (V)} = -40V$
- $R_{DS(ON)} < 44m\Omega$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 64m\Omega$ ($V_{GS} = -4.5V$)
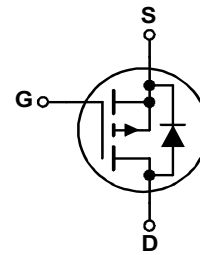- High performance trench technology for extremely low $r_{DS(on)}$
- RoHS Compliant

General Description

This P-Channel MOSFET has been produced technology to deliver low $r_{DS(on)}$ and optimized Bvdss capability to offer superior performance benefit in the applications.

Application

- Inverter
- Power Supplies

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

MOSFET Maximum Ratings $T_C = 25°C$ unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			-40	V
V_{GS}	Gate to Source Voltage			±20	V
I_D	Drain Current -Continuous (Package limited)	$T_C = 25°C$		-14	A
	-Continuous (Silicon limited)	$T_C = 25°C$	(Note 1)	-24	
	-Continuous	$T_A = 25°C$	(Note 1a)	-6.7	
	-Pulsed			-60	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	84	mJ
P_D	Power Dissipation	$T_C = 25°C$		42	W
	Power Dissipation		(Note 1a)	3	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

			Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case		3.0	°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
Off Characteristics							
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V		-40			V
$\dfrac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C			-32		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -32V,				-1	μA
		V_{GS} = 0V	T_J = 125°C			-100	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V				±100	nA
On Characteristics							
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250μA		-1.4	-1.6	-3.0	V
$\dfrac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C			4.7		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = -10V, I_D = -6.7A			36	44	mΩ
		V_{GS} = -4.5V, I_D = -5.5A			48	64	
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -6.7A			16		S
Dynamic Characteristics							
C_{iss}	Input Capacitance	V_{DS} = -20V, V_{GS} = 0V, f = 1MHz			1165	1550	pF
C_{oss}	Output Capacitance				165	220	pF
C_{rss}	Reverse Transfer Capacitance				90	135	pF
R_g	Gate Resistance	f = 1MHz			4		Ω
Switching Characteristics							
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -20V, I_D = -6.7A V_{GS} = -10V, R_{GEN} = 6Ω			6	12	ns
t_r	Rise Time				15	26	ns
$t_{d(off)}$	Turn-Off Delay Time				22	35	ns
t_f	Fall Time				7	14	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{DD} = -20V, I_D = -6.7A V_{GS} = -10V			21	29	nC
Q_{gs}	Gate to Source Gate Charge				3.4		nC
Q_{gd}	Gate to Drain "Miller" Charge				4		nC
Drain-Source Diode Characteristics							
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = -6.7A (Note 2)			0.86	1.2	V
t_{rr}	Reverse Recovery Time	I_F = -6.7A, di/dt = 100A/μs			29	43	ns
Q_{rr}	Reverse Recovery Charge				30	44	nC

Notes:

1: $R_{\theta JA}$ is sum of 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 $R_{\theta JC}$ is determined by the user's board design.

a. 40°C/W when mounted on a 1 in^2 pad of 2 oz copper

b. 96°C/W when mounted on a minimum pad.

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

3: Starting T_J = 25°C, L = 3mH, I_{AS} = 7.5A, V_{DD} = 40V, V_{GS} = 10V.

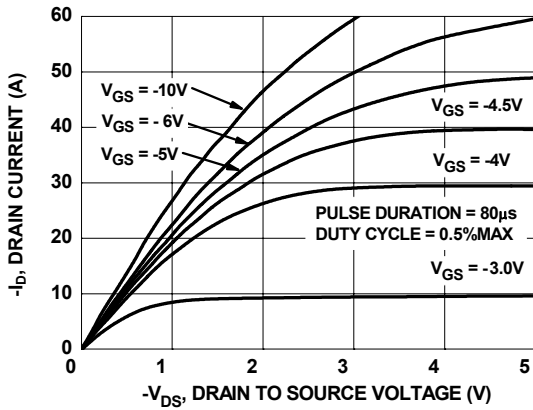**Typical Characteristics** T_J = 25°C unless otherwise noted

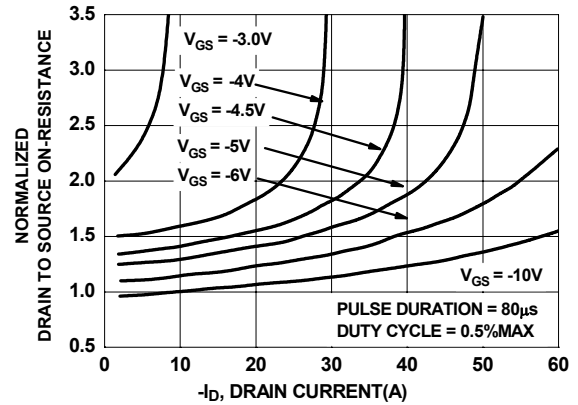Figure 1. On Region Characteristics

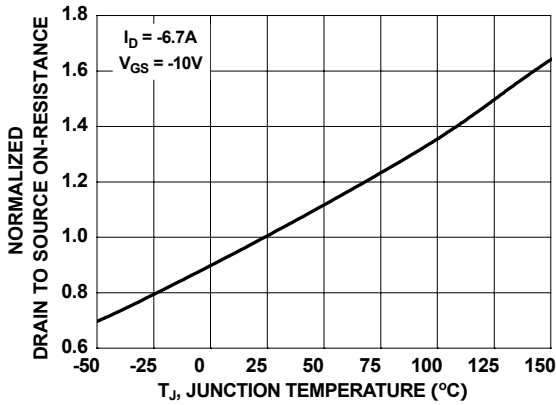Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

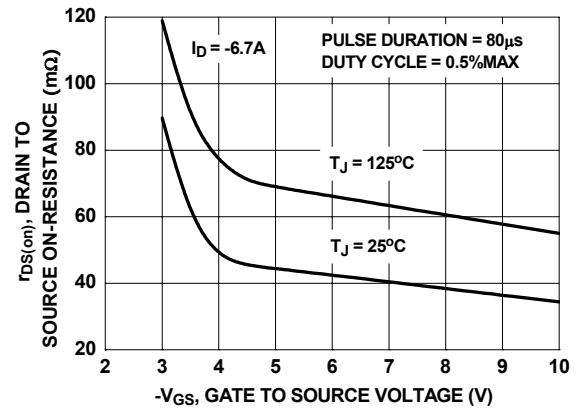Figure 3. Normalized On Resistance vs Junction Temperature

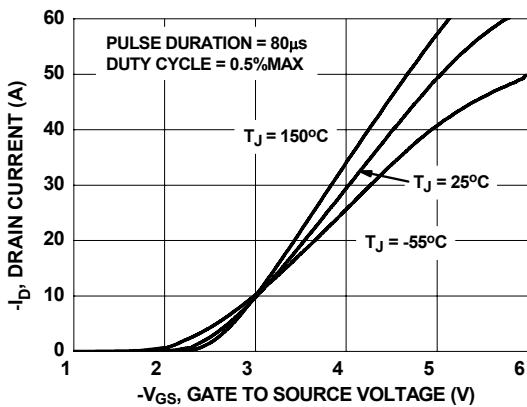Figure 4. On-Resistance vs Gate to Source Voltage
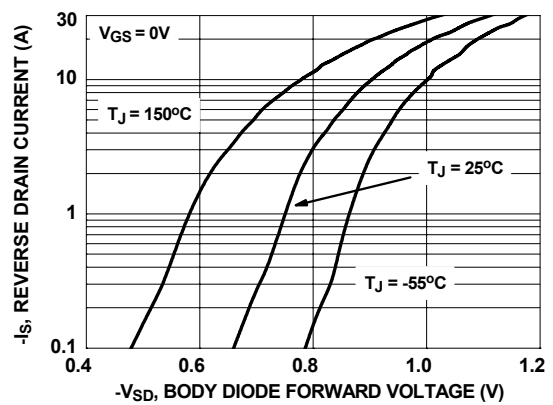
Figure 5. Transfer Characteristics

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

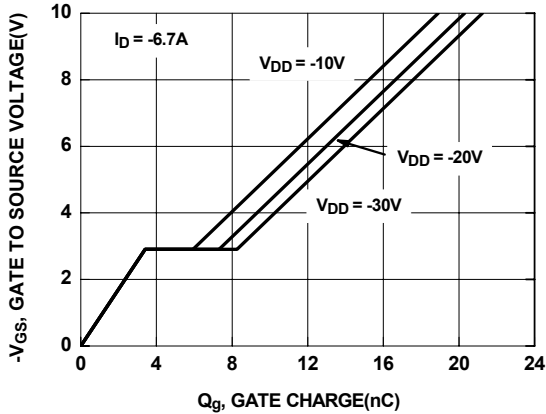## Typical Characteristics $T_J = 25°C$ unless otherwise noted

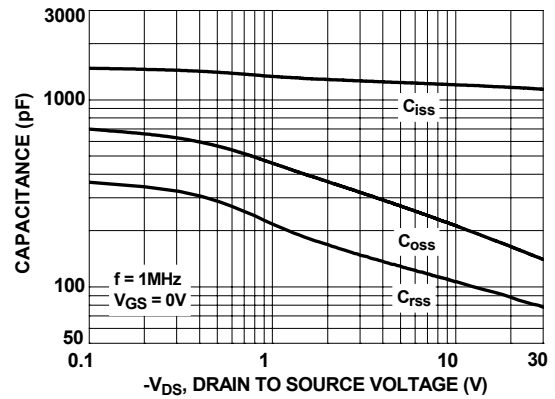**Figure 7. Gate Charge Characteristics**

Figure 8. Capacitance vs Drain to Source Voltage
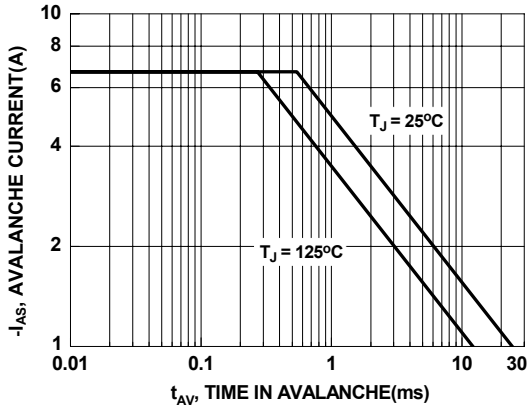

Figure 9. Unclamped Inductive Switching Capability
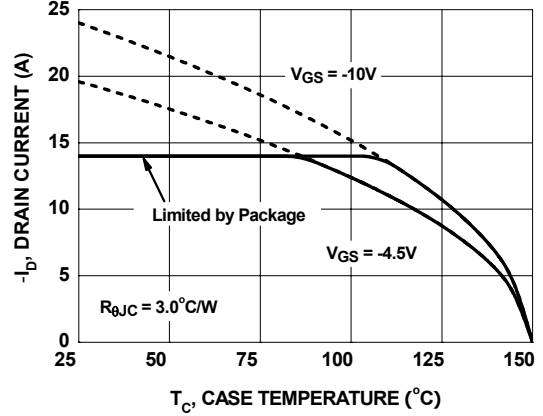

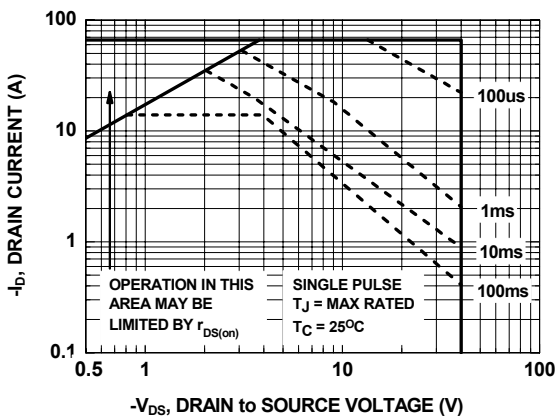**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

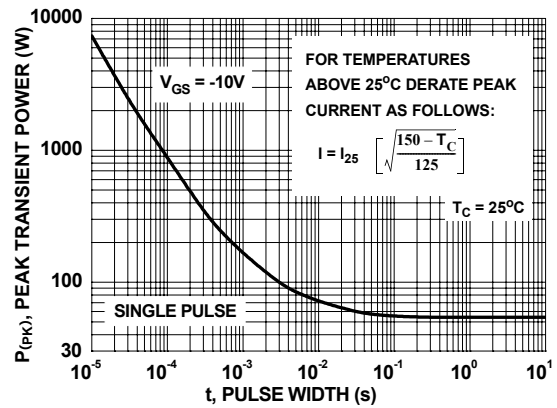**Figure 11. Forward Bias Safe Operating Area**

Figure 12. Single Pulse Maximum Power Dissipation

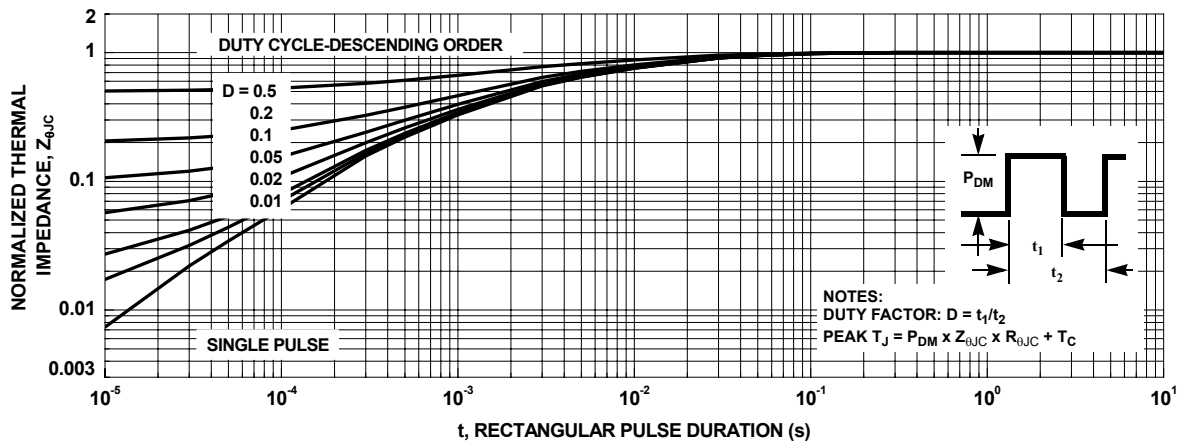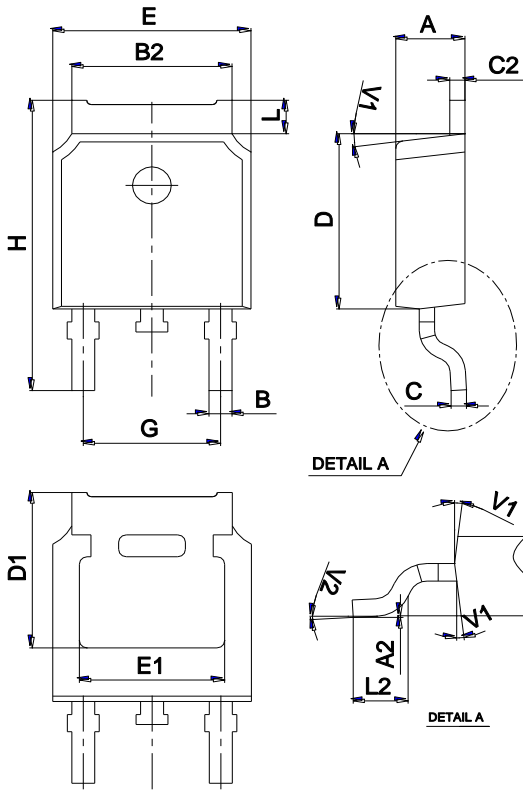## Typical Characteristics $T_J = 25°C$ unless otherwise noted

Figure 13. 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

FDD4243
xxxx

Ordering information

Order code	Package	Baseqty	Deliverymode
FDD4243	TO-252	2500	Tape and reel