

Description

N-channel Enhancement Mode Power MOSFET

Features

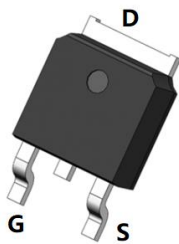
- 650V, 5 A
 $R_{DS(ON)}$ TYP 2.35Ω@ $V_{GS} = 10V$
- Fast Switching
- Improved dv/dt Capability

Application

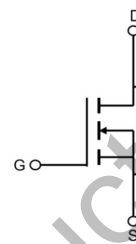
- Load Switch
- PWM Application
- Power management



100% UIS TESTED!
100% ΔVds TESTED!



TO-252-3L top view



Schematic Diagram

Package Marking and Ordering Information

Part Number	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
FQD5N65	TAPING	TO-252-3L	13inch	2500	25000

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
V _{DSS}	Drain-Source Voltage	650	V
V _{GSS}	Gate-Source Voltage	±30	V
I _D	Continuous Drain Current	T _C = 25°C T _C = 100°C	5 2.9 A A
I _{DM}	Pulsed Drain Current ^{note1}	18	A
E _{AS}	Single Pulsed Avalanche Energy ^{note2}	199	mJ
P _D	Power Dissipation	T _C = 25°C	78 W
R _{θJC}	Thermal Resistance, Junction to Case	1.68	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	111	°C/W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	650	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650V, V _{GS} = 0V, T _J = 25℃	-	-	1	μA
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±30V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = 250μA	2	-	4	V
R _{DS(on)} note3	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 2 A	-	2.35	2.7	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	650	-	pF
C _{OSS}	Output Capacitance		-	55	-	pF
C _{rss}	Reverse Transfer Capacitance		-	3.2	-	pF
Q _g	Total Gate Charge	V _{DS} =520V, I _D =4A ,V _{GS} = 10V	-	3.2	-	nC
Q _{gs}	Gate-Source Charge		-	5.1	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	12	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 325V, I _D =4A ,R _G = 10 Ω	-	15	-	ns
t _r	Turn-On Rise Time		-	33	-	ns
t _{d(off)}	Turn-Off Delay Time		-	52	-	ns
t _f	Turn-Off Fall Time		-	15	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	29	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _{SD} = 4 A ,T _J = 25℃	-	-	1.5	V
t _{rr}	Reverse Recovery Time	V _R = 40 0V, I _F = 4 A, di/dt =100A/μs	-	288	-	ns
Q _{rr}	Reverse Recovery Charge		-	1.4	-	μC

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition: $T_J = 25^{\circ}\text{C}$, $V_{DD} = 50V$, $V_G = 10V$, $L = 10mH$, $I_{AS} = 7A$ 3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Performance Characteristics

Figure1: Output Characteristics

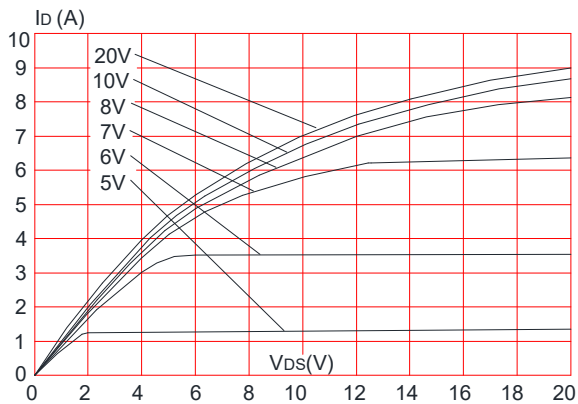


Figure 2: Typical Transfer Characteristics

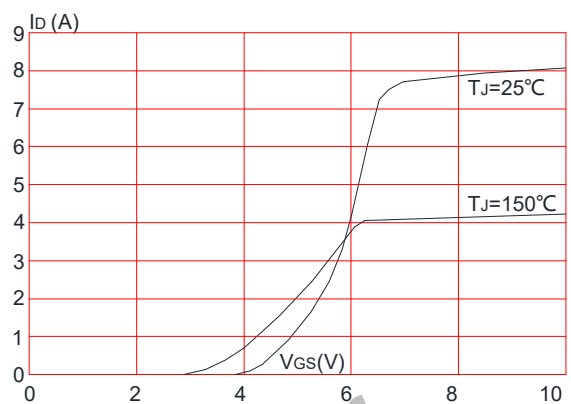


Figure 3: On-resistance vs. Drain Current

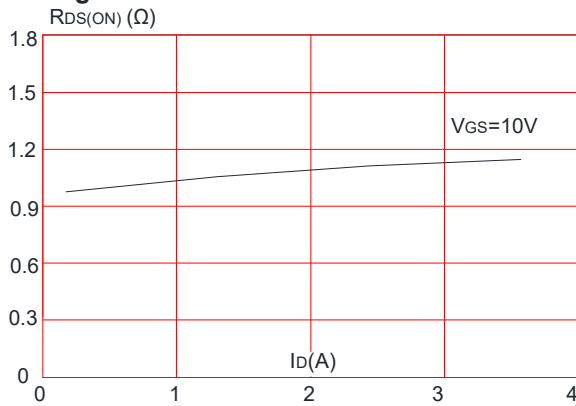


Figure 4: Body Diode Characteristics

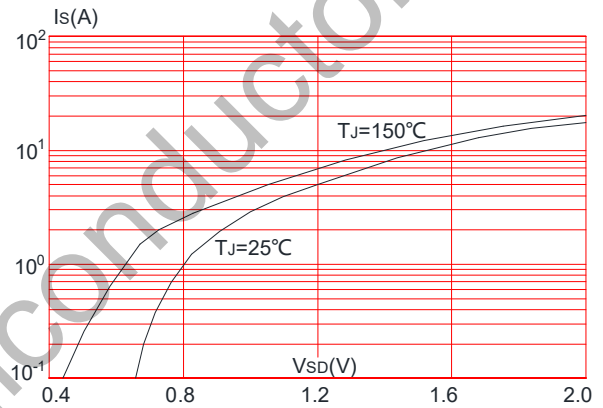


Figure 5: Gate Charge Characteristics

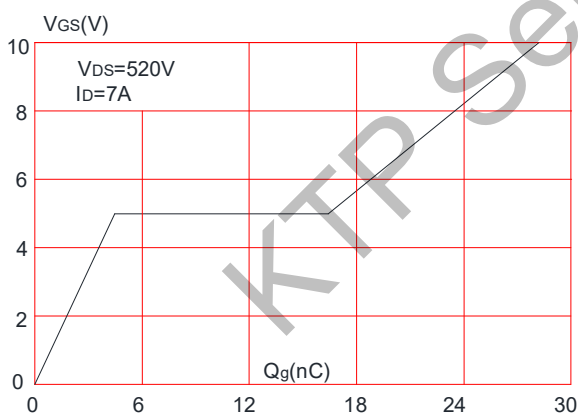


Figure 6: Capacitance Characteristics

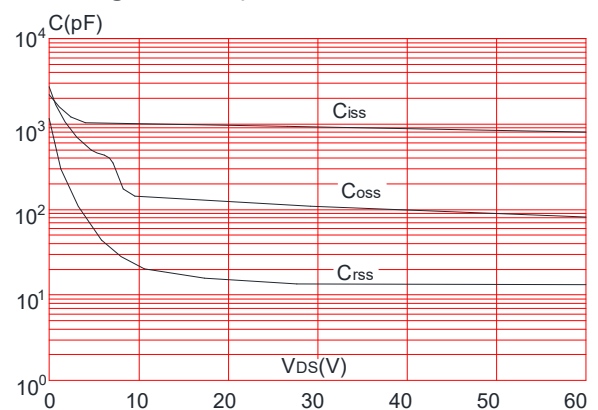


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

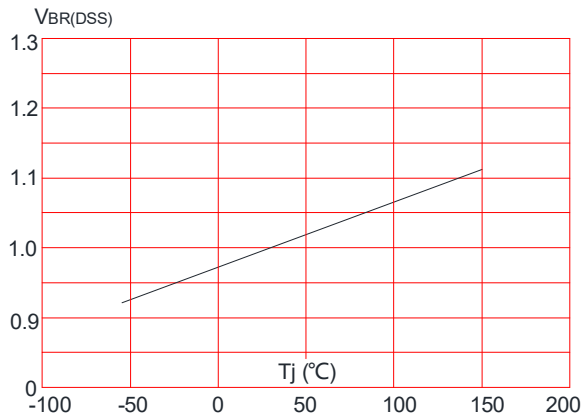


Figure 8: Normalized on Resistance vs. Junction Temperature

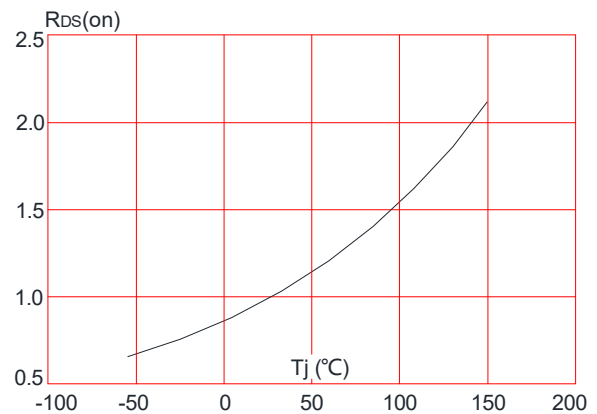


Figure 9: Maximum Safe Operating Area

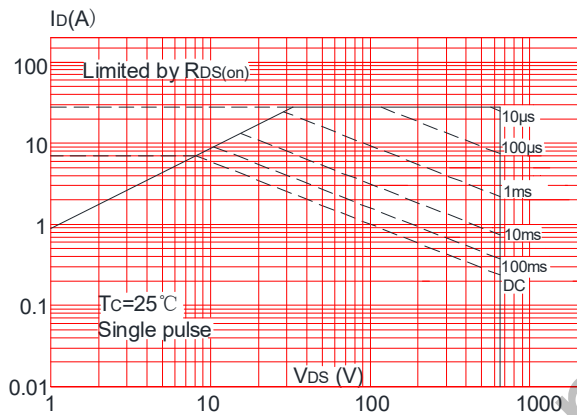


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

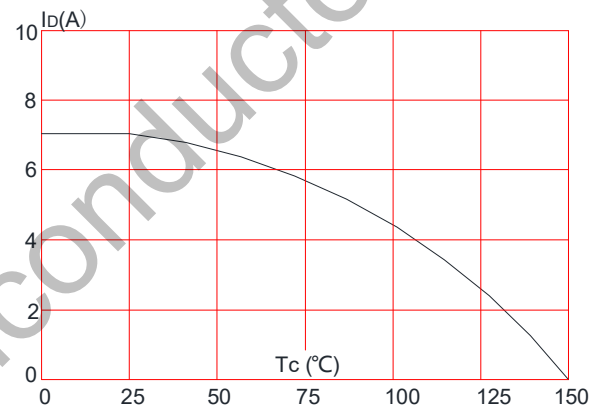
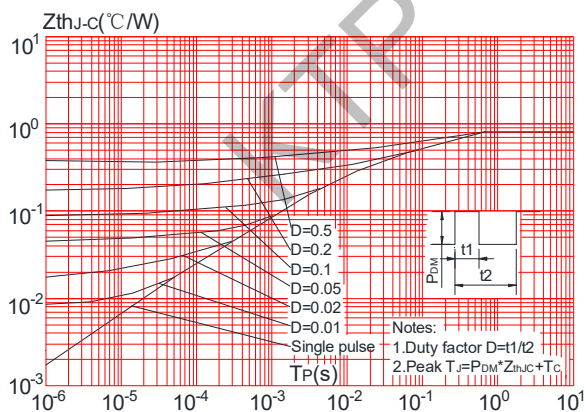


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

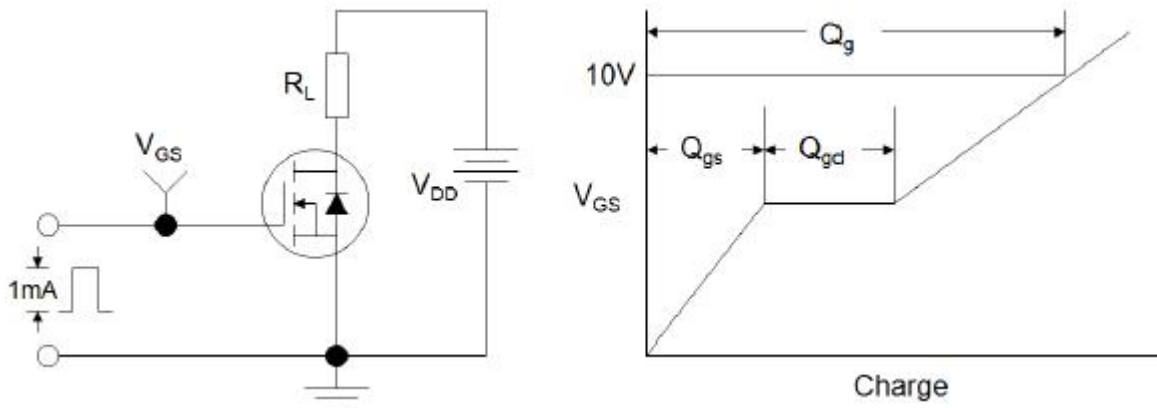


Figure1:Gate Charge Test Circuit & Waveform

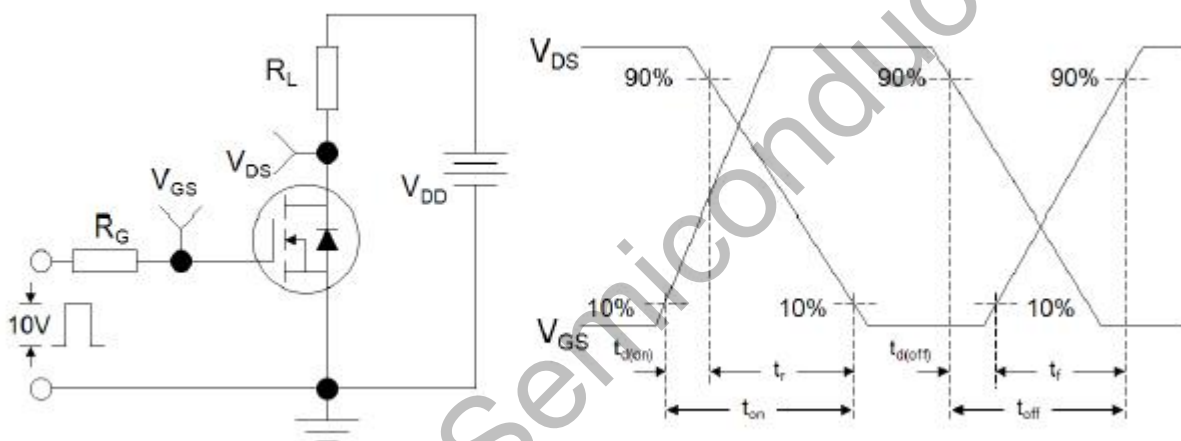


Figure 2: Resistive Switching Test Circuit & Waveforms

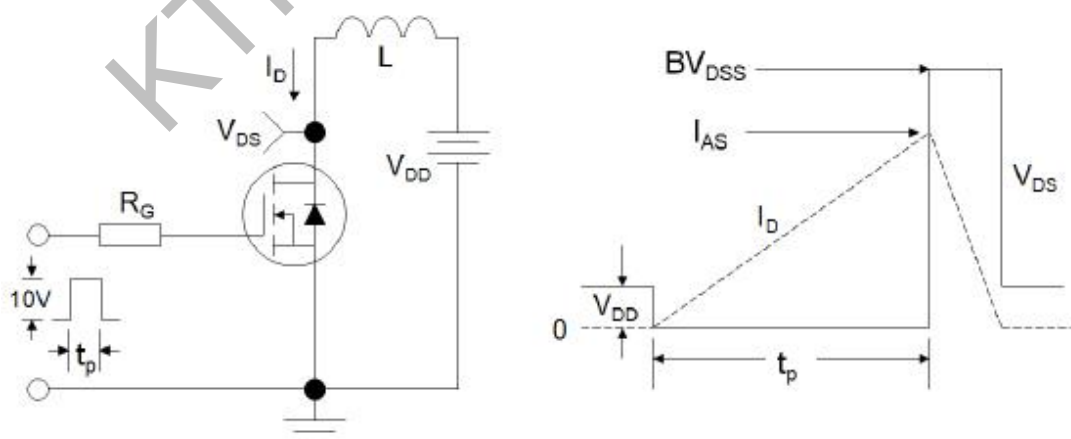
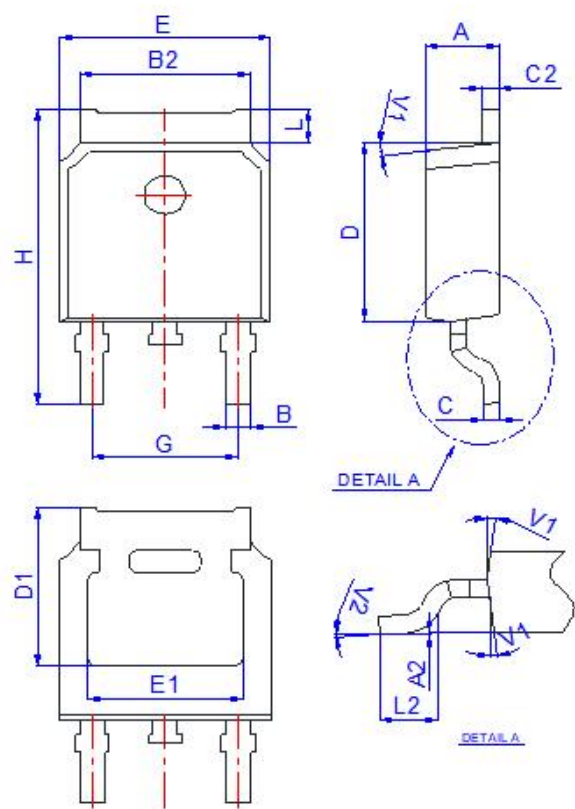


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-TO-252-3L



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°