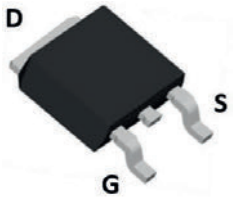
GOOD-ARK SEMICONDUCTOR

GSFD4N65

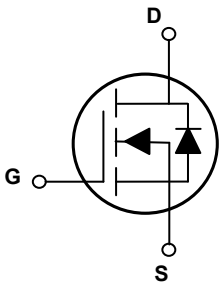
650V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	650V
$R_{DS(ON)}$	2.3Ω (typ.)
I_D	4A



TO-252 (DPAK)



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The GSFD4N65 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

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

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DSS}	650	V
Gate-Source Voltage	V_{GSS}	±30	V
Continuous Drain Current, @ Steady-State (T_C=25°C)	I_D	4	A
Continuous Drain Current, @ Steady-State (T_C=100°C)		2.5	A
Pulsed Drain Current[1]	I_{DM}	16	A
Single Pulsed Avalanche Energy[2]	E_{AS}	215	mJ
Power Dissipation (T_C=25°C)	P_D	77	W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.62	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	110	°C/W
Operating and Storage Temperature Range	T_J/T_{STG}	-55 to +150	°C

Electrical Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
On / Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	650	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V, T_J=25°C	-	-	1	μA
Gate to Body Leakage Current	I_{GSS}	V_{GS}=±30V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2	-	4	V
Static Drain-Source On-Resistance[3]	$R_{DS(on)}$	V_{GS}=10V, I_D=2A	-	2.3	2.7	Ω
Dynamic and Switching Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, F=1.0MHz	-	430	-	pF
Output Capacitance	C_{oss}		-	55	-	pF
Reverse Transfer Capacitance	C_{rss}		-	4.1	-	pF
Total Gate Charge	Q_g	V_{DD}=520V, I_D=4A, V_{GS}=10V	-	12.5	-	nC
Gate-Source Charge	Q_{gs}		-	2.74	-	nC
Gate-Drain (“Miller”) Charge	Q_{gd}		-	6.31	-	nC
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=325V, I_D=4A, R_G=25Ω, V_{GS}=10V	-	9.93	-	nS
Turn-On Rise Time	t_r		-	25.6	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	27.6	-	nS
Turn-Off Fall Time	t_f		-	25.6	-	nS
Source-Drain Ratings and Characteristics						
Maximum Continuous Drain to Source Diode Forward Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	4	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}		-	-	16	A
Drain to Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=4A, T_J=25°C	-	-	1.4	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_S=4A, di/dt=100A/μS	-	450	-	nS
Reverse Recovery Charge	Q_{rr}		-	1.87	-	μC

Note:

1. Repetitive rating: pulse width limited by maximum junction temperature.
2. I_{AS}=3.6A, L=30mH, V_{DD}=100V, R_G=25Ω, starting T_J=25°C.
3. Pulse test: pulse width ≤ 300μS, duty cycle ≤ 1%.

Typical Electrical and Thermal Characteristic Curves

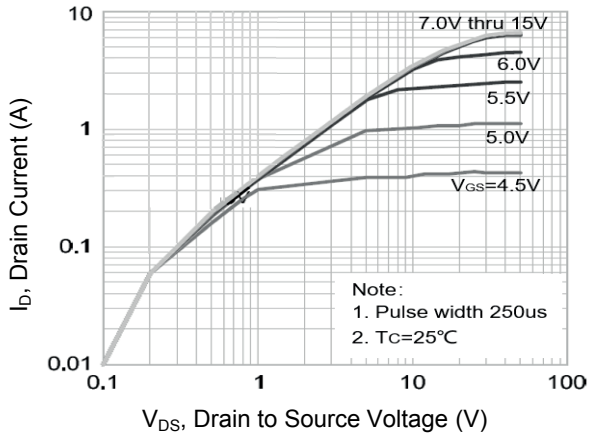


Figure 1. Output Characteristics

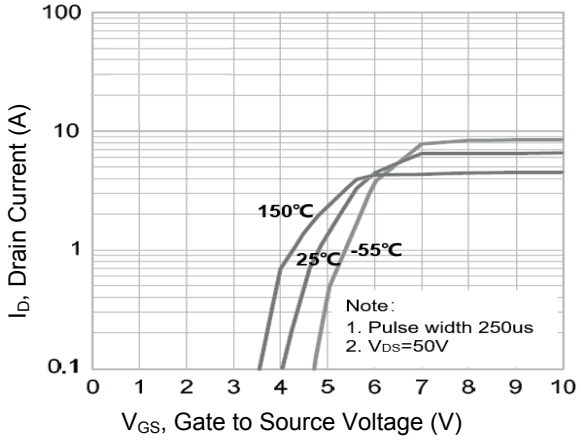


Figure 2. Transfer Characteristics

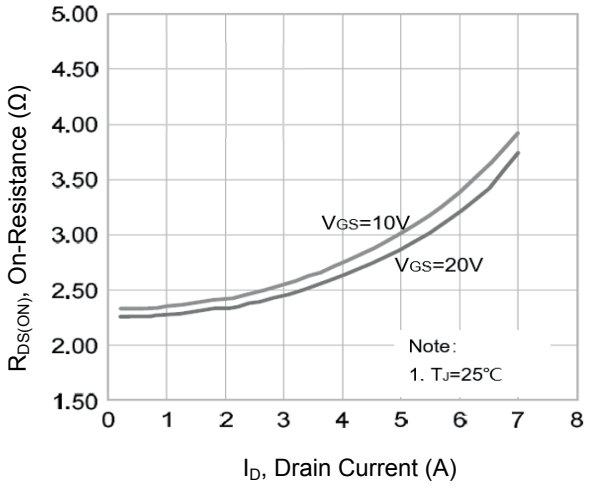


Figure 3. $R_{DS(ON)}$ Vs. Drain Current

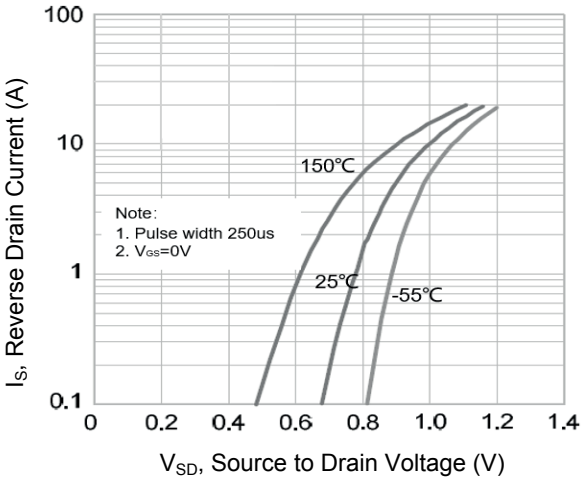


Figure 4. Body Diode Characteristics

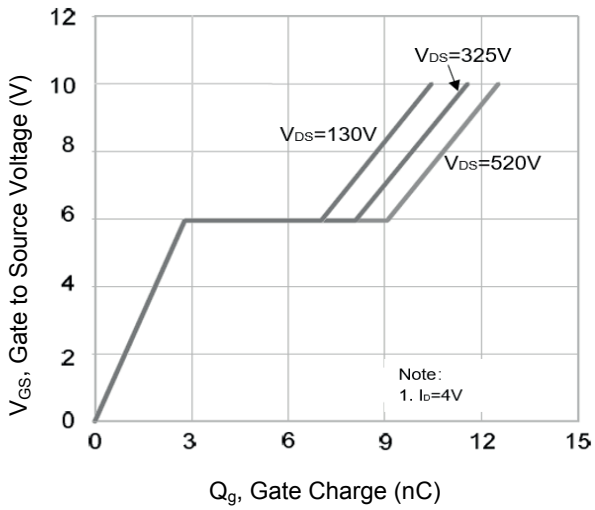


Figure 5. Gate Charge

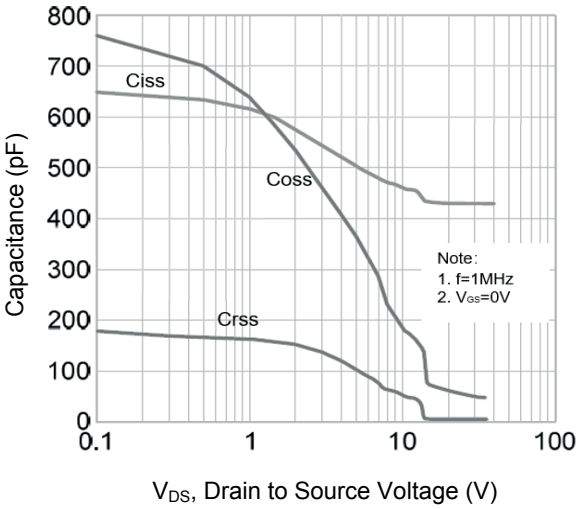


Figure 6. Capacitance Characteristics

Typical Electrical and Thermal Characteristic Curves

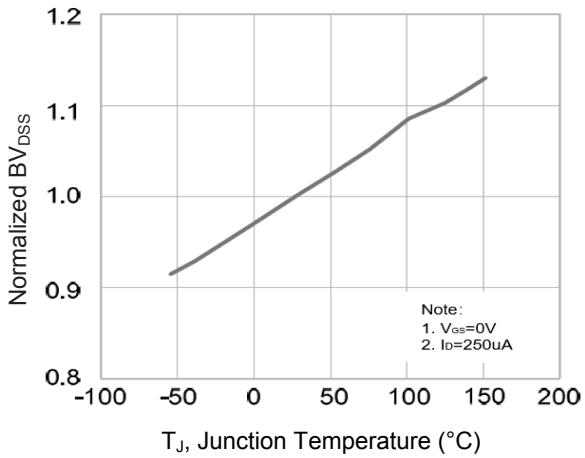


Figure 7. Normalized BV_{DSS} Vs. T_J

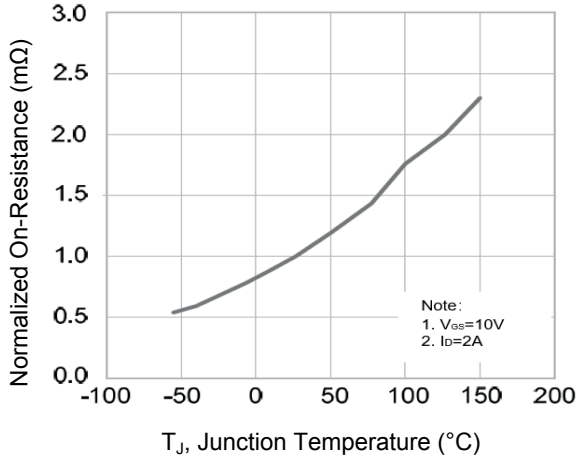


Figure 8. Normalized $R_{DS(ON)}$ Vs. T_J

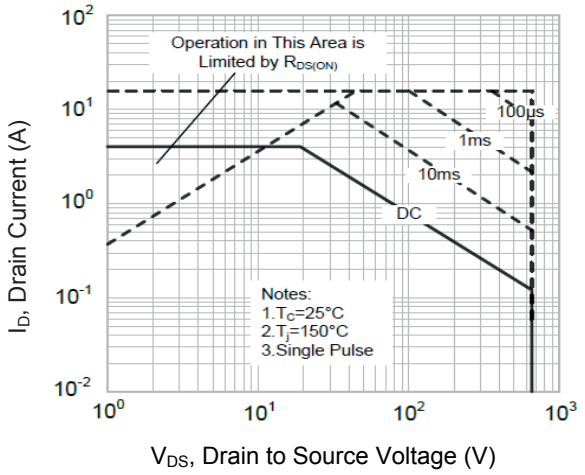


Figure 9. Safe Operation Area

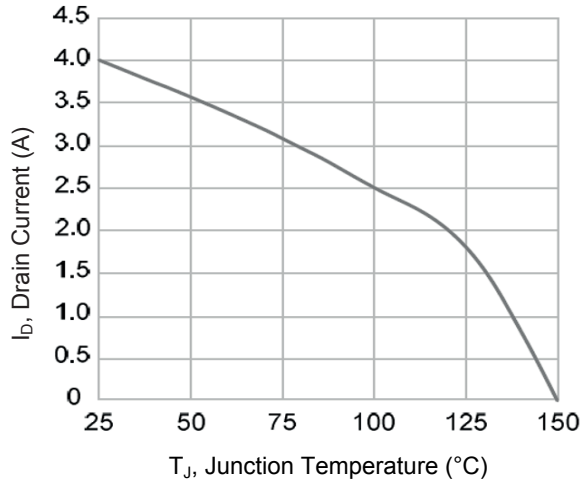
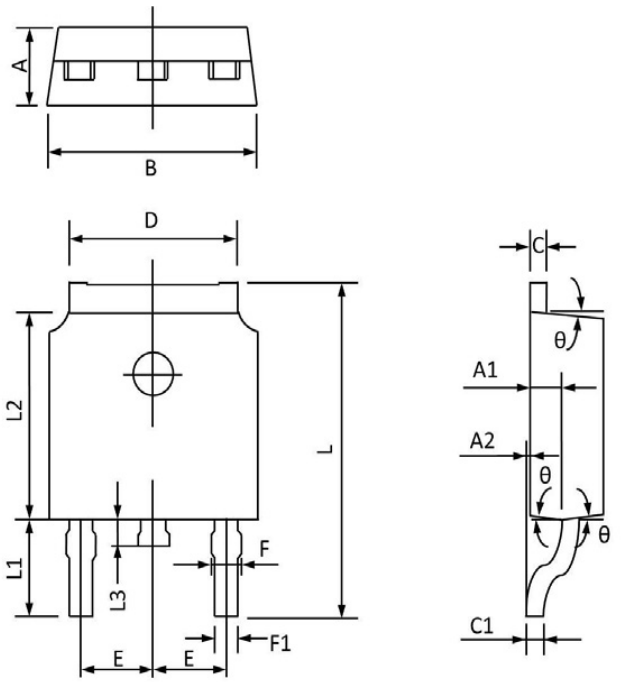


Figure 10. Current De-Rating

Package Outline Dimensions TO-252(DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.20	2.40	0.087	0.094
A1	0.91	1.11	0.036	0.044
A2	0.00	0.15	0.000	0.006
B	6.40	6.80	0.252	0.268
C	0.45	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.10	5.50	0.201	0.217
E	2.19	2.39	0.086	0.094
F	0.60	0.94	0.024	0.037
F1	0.50	0.86	0.020	0.034
L	9.40	10.40	0.370	0.409
L1	2.40	3.00	0.094	0.118
L2	5.40	6.20	0.213	0.244
L3	0.60	1.20	0.024	0.047
θ	3°	9°	3°	9°