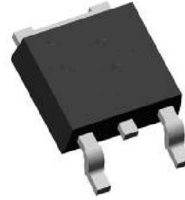
GOOD-ARK SEMICONDUCTOR

GSFD65N11

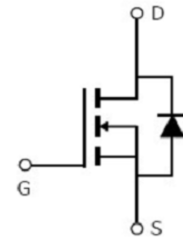
650V N-Channel MOSFET

Main Product Characteristics

V_{DSS}	650V
$R_{DS(on)}$	0.30Ω (typ.)
I_D	11A



TO-252 (DPAK)



Schematic Diagram

Features and Benefits

- High dv/dt and avalanche capabilities
- 100% avalanche tested
- Low input capacitance and gate charge
- Low gate input resistance

Description

The GSFD65N11 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 supply and a wide variety of other applications.

Absolute Maximum Ratings

Parameter	Symbol	Max.	Unit
Continuous Drain Current, V_{GS} @ 10V ①	I_D @ T_C = 25°C	11	A
Pulsed Drain Current ②	I_{DM}	33	A
Power Dissipation ③	P_D @T_C = 25°C	83	W
Drain-Source Voltage	V_{DS}	650	V
Gate-to-Source Voltage	V_{GS}	± 30	V
Single Pulse Avalanche Energy	E_{AS}	215	mJ
Avalanche Current	I_{AS}	1.8	A
Operating Junction and Storage Temperature Range	T_J , T_{STG}	-55 to +150	°C
Junction-to-Case ③	$R_{θJC}$	1.5	°C/W
Junction-to-Ambient (t ≤ 10s) ④	$R_{θJA}$	62	°C/W

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

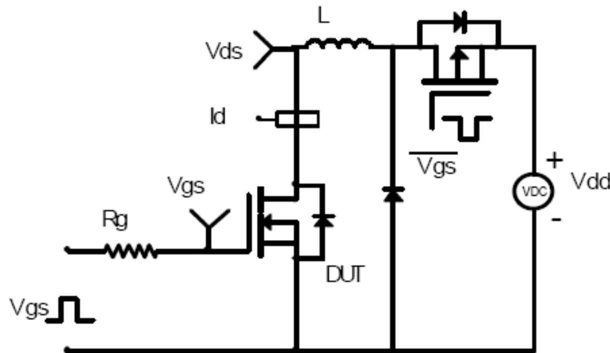
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	650	-	-	V
Static Drain-to-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D =5.5A	-	0.30	0.36	Ω
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5	-	4.5	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS} =650V, V_{GS} = 0V	-	-	1	μA
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS} =30V	-	-	100	nA
		V_{GS} = -30V	-	-	-100	
Total Gate Charge	Q_g	I_D = 11A, V_{DS}=520V, V_{GS} = 10V	-	22	-	nC
Gate-to-Source Charge	Q_{gs}		-	4	-	
Gate-to-Drain ("Miller") Charge	Q_{gd}		-	8	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V, V_{DS} =400V, R_{GEN}=25Ω, I_D =11A	-	70	-	ns
Rise Time	t_r		-	70	-	
Turn-Off Delay Time	$t_{d(off)}$		-	145	-	
Fall Time	t_f		-	59	-	
Input Capacitance	C_{iss}	V_{GS} = 0V V_{DS} =100V f = 1MHz	-	808	-	pF
Output Capacitance	C_{oss}		-	33	-	
Reverse Transfer Capacitance	C_{rss}		-	2	-	

Source-Drain Ratings and Characteristics

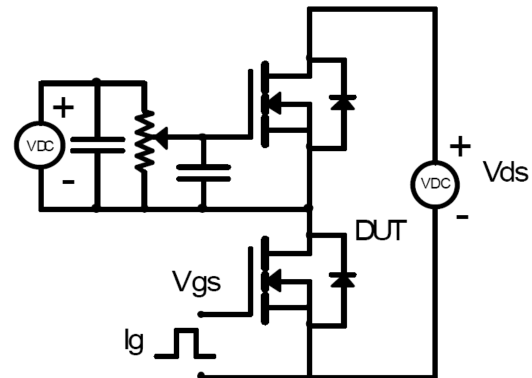
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current (Body Diode) ①	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	9.4	A
Pulsed Source Current (Body Diode)	I_{SM}		-	-	33	A
Diode Forward Voltage	V_{SD}	I_S=5.5A, V_{GS}=0V	-	0.9	1.2	V
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =9.4A, di/dt = 100A/μs	-	377	-	ns
Reverse Recovery Charge	Q_{rr}		-	3400	-	nc

Test Circuits and Waveforms

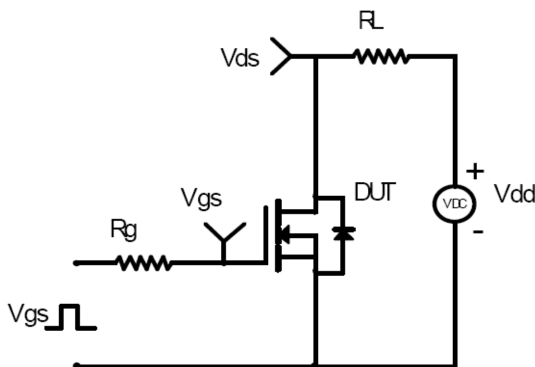
EAS Test Circuit:



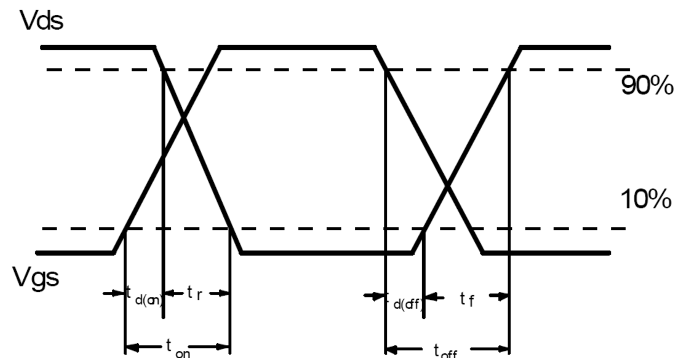
Gate charge test circuit:



Switching Time Test Circuit:



Switching Waveforms:



Notes:

① Calculated continuous current based on maximum allowable junction temperature.

② Repetitive rating; pulse width limited by max. junction temperature.

③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④ The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C

Typical Electrical and Thermal Characteristic Curves

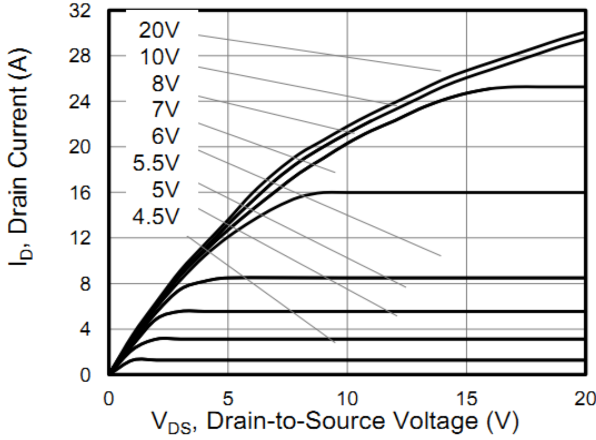


Figure 1. Typical Output Characteristics

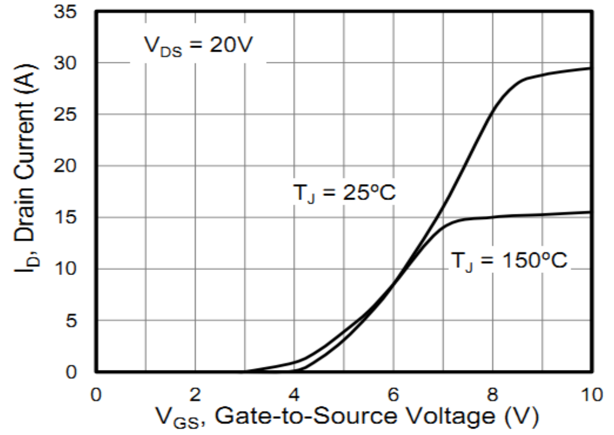


Figure 2. Transfer Characteristics

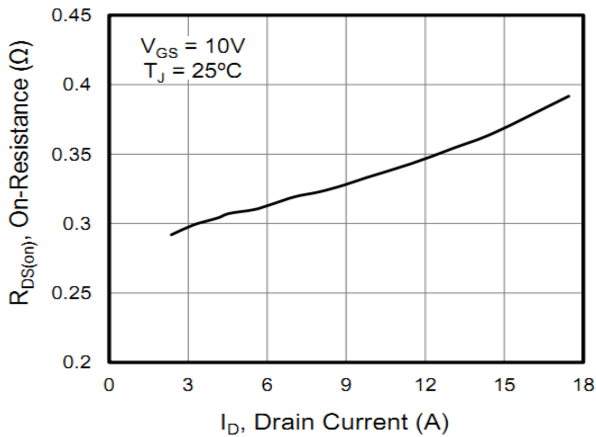


Figure 3. On-Resistance vs. Drain Current

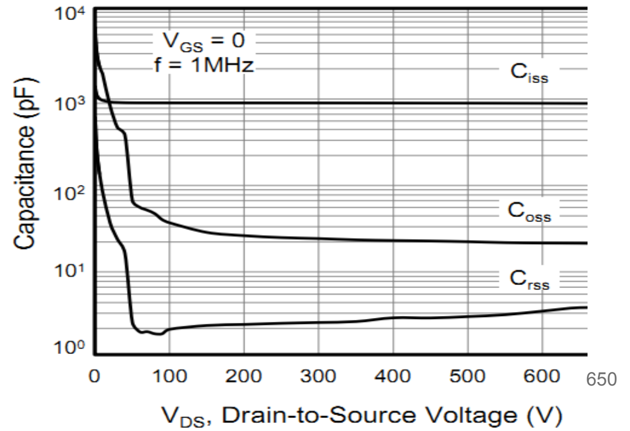


Figure 4. Capacitance

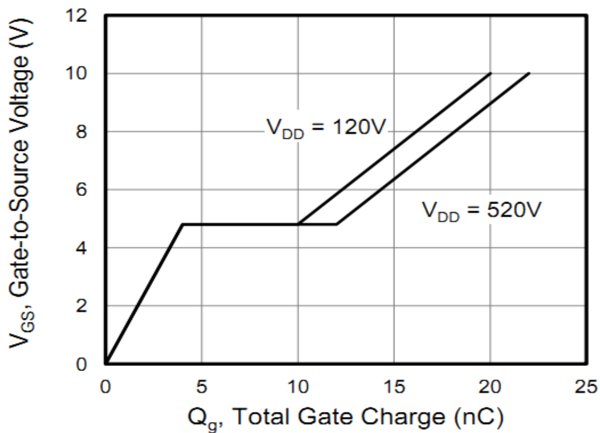


Figure 5. Gate Charge

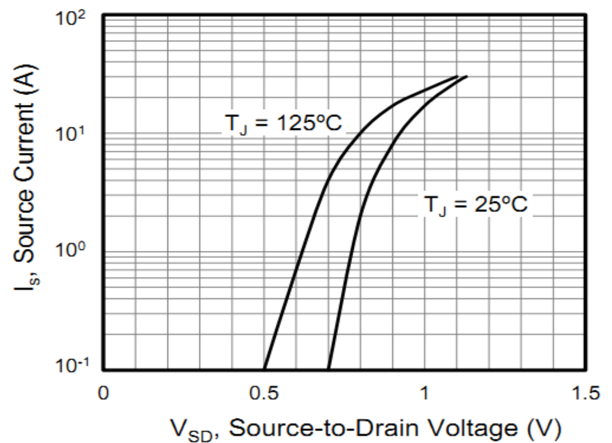


Figure 6. Body Diode Forward Voltage

Typical Electrical and Thermal Characteristic Curves

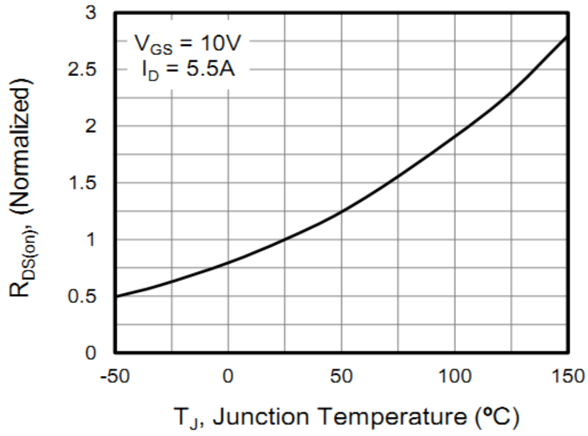


Figure 7. On-Resistance vs. Junction Temperature

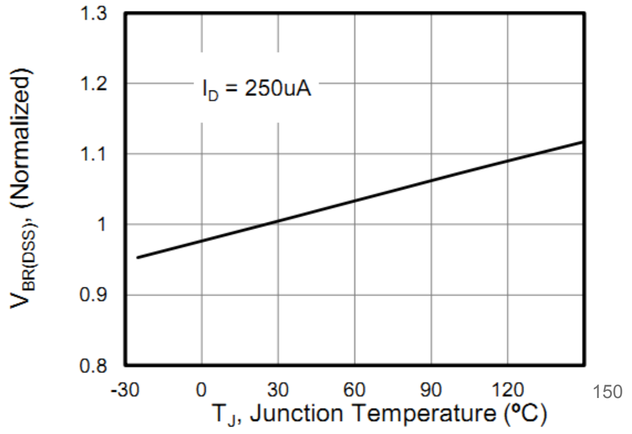


Figure 8. Breakage Voltage vs. Junction Temperature

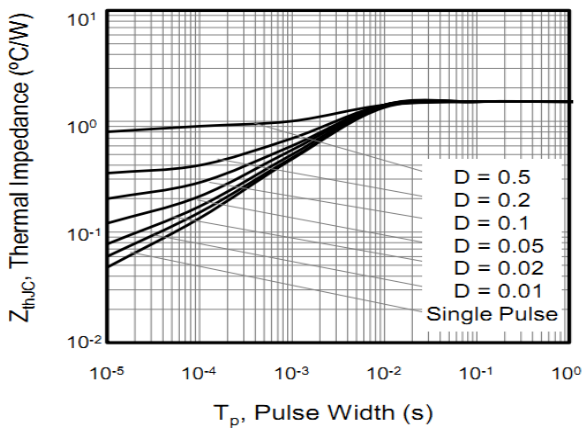


Figure 9. Transient Thermal Impedance

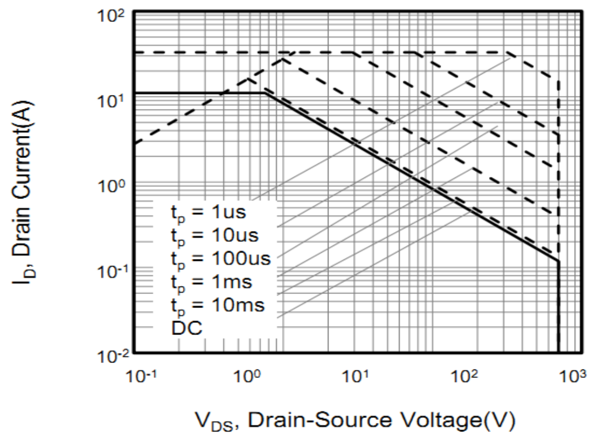


Figure 10. Safe Operation Area

Package Outline Dimensions TO-252(DPAK)

Dimensions In Millimeters