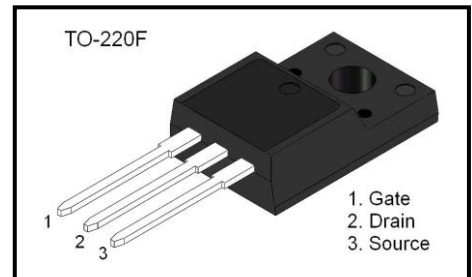
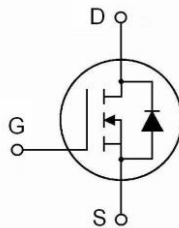


General Description

The ZH7N65F is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristic. This power MOSFET is usually used in high speed switching applications including power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits

Features

- V_{DS} 650V
- I_D 7A
- $R_{DS(ON)}$ ($V_{GS} = 10V$) $< 1.35\Omega$
- Fast Switching Capability
- Avalanche Energy Specified
- Improved dv/dt Capability, High Ruggedness



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Parameter		Symbol	Ratings	Units
Gate-Drain Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_D	7	A
	Pulsed (Note 1)	I_{DM}	28	
Power Dissipation		P_D	48	W
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	212	mJ
	Repetitive	E_{AR}	14.2	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Junction Temperature		T_J	150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55~155	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Thermal Characteristic

Parameter	Symbol	Value	Units
Maximum Thermal Resistance, Junction-case	$R_{\theta JC}$	2.6	$^\circ\text{C/W}$
Maximum Thermal Resistance, Junction-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

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

Parameter	Symbol	Test Conditions	Min.	Typ	Max.	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V,I _D =250μA	650			V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D = 250μA, Referenced to 25 °C		0.8		V/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V			1	μA
6Gate Leakage Current	I _{GSS}	V _{DS} =0V,V _{GS} =±30V			±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	2.0		4.0	V
Drain-source On-Resistance	R _{DS(ON)}	V _{GS} = 10V,I _D = 3.5A		1.0	1.35	Ω
Forward Transconductance	g _{FS}	V _{DS} = 10V,I _D = 3.5A(Note4)		8.0		S
Dynamic Characteristics						
Input Capacitance	Ciss	V _{DS} = 25V,V _{GS} = 0V, f = 1.0MHz		1200	1600	pF
Output Capacitance	Coss			150	190	
Reverse Transfer Capacitance	Crss			18	25	
Switching Characteristics)						
Turn-On Delay Time	t _{d(on)}	V _{DS} = 325V, I _D = 7.0A R _G = 25Ω (Note4, 5)		35	80	ns
Turn-on Rise Time	t _r			79	165	
Turn-Off elay Time	t _{d(off)}			80	160	
Turn-Off Fall	t _f			52	120	
Total Gate Charge	Q _g	V _{DS} = 520V, I _D = 7.0A V _{GS} = 10V (Note4, 5)		30		nC
Gate-Source Charge	Q _{gs}			6.5		
Gate-Drain Charge	Q _{gd}			16		
Drain-Source Diode Characteristics						
Diode Forward Voltage ²	V _{SD}	V _{GS} =0V, I _S =7.0A			1.4	V
Diode Forward Current	I _S	-			7.0	A
Pulsed Diode Forward Current	I _{SM}				28	A
Reverse Recovery Time	t _{rr}	I _S = 7.0A, V _{GS} = 0V		320		ns
Reverse Recovery Charge	Q _{rr}	dI _F /dt =100A/μs (Note 1)		2.4		nC

Note 1. Repeativity rating: pulse width limited by junction temperature

2. $L=25\text{mH}$, $I_{AS}=7.0A$, $R_G=25\Omega$, Starting $T_j=25^\circ\text{C}$ 3. $I_{SD}\leq 7.0A$, $di/dt\leq 300A/\mu s$, $V_{DD}\leq BV_{DSS}$, Starting $T_j=25^\circ\text{C}$ 4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

5. Essentially independent of operating temperature.

Test Circuits and Waveforms

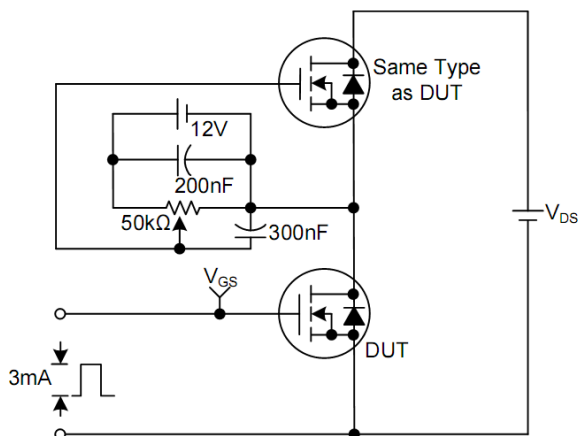


Figure 3. Gate Charge Test Circuit

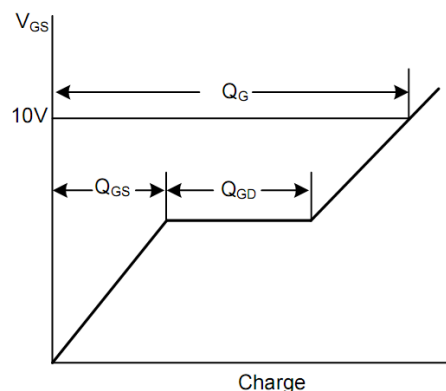


Figure 4. Gate Charge Waveforms

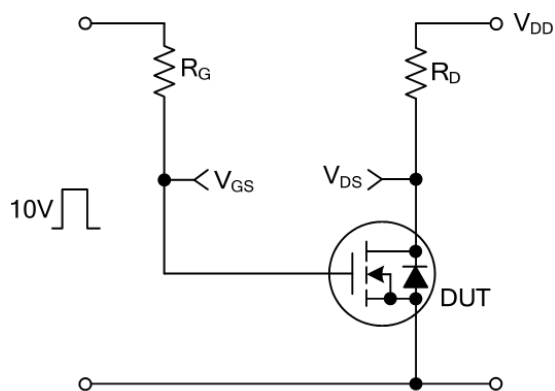


Figure 5. Resistive Switching Circuit

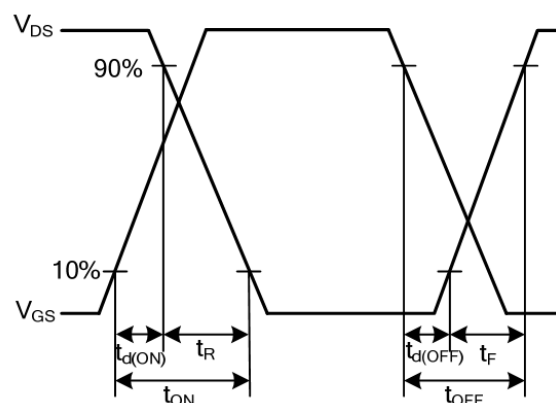


Figure 7. Resistive Switching Waveforms

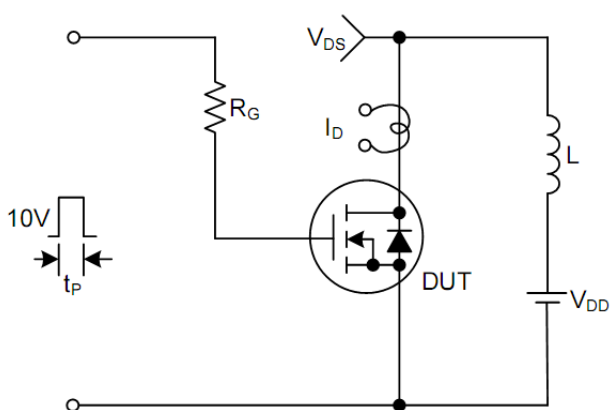


Figure 7. Unclamped Inductive Switching Test Circuit

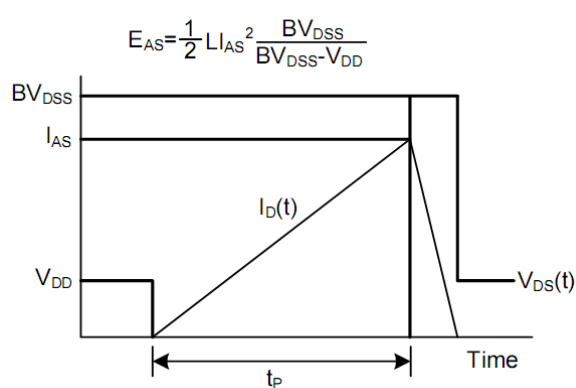


Figure 8. Unclamped Inductive Switching Waveforms

Typical Characteristics

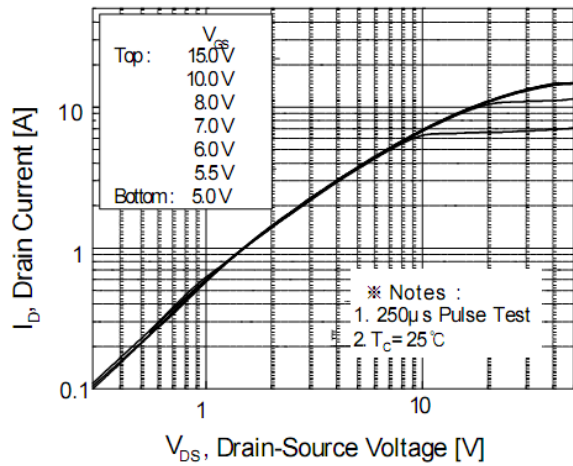


Figure 1 Output Characteristics

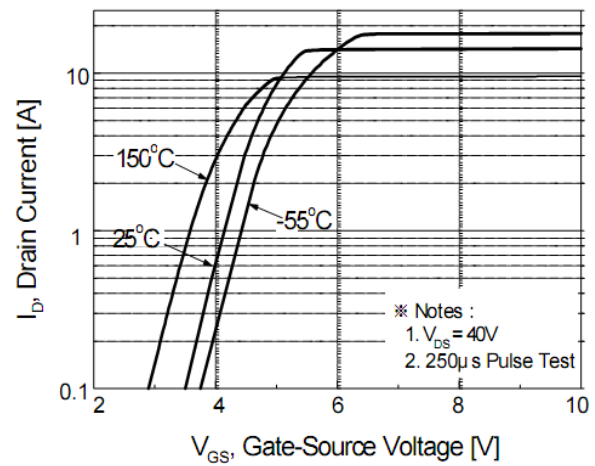


Figure 2. Transfer Characteristics

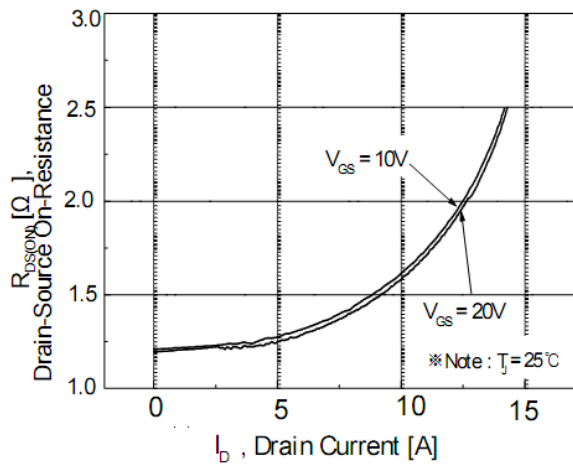


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

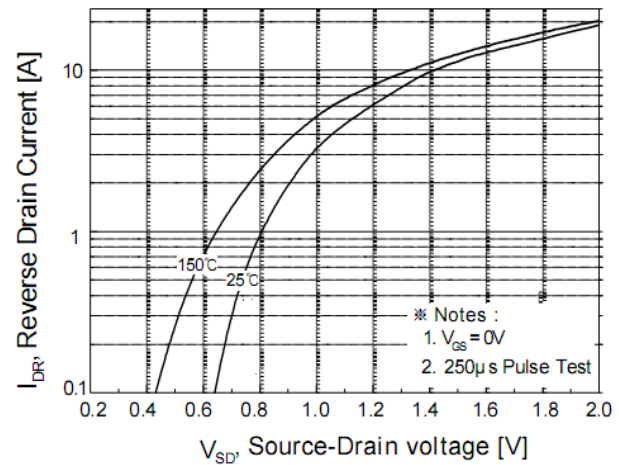


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

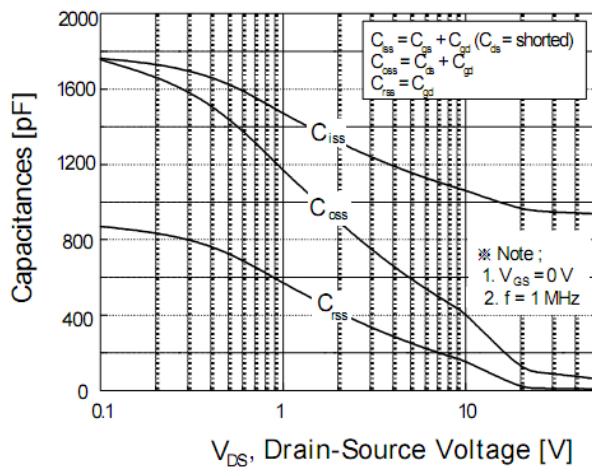


Figure 5. Capacitance Characteristics

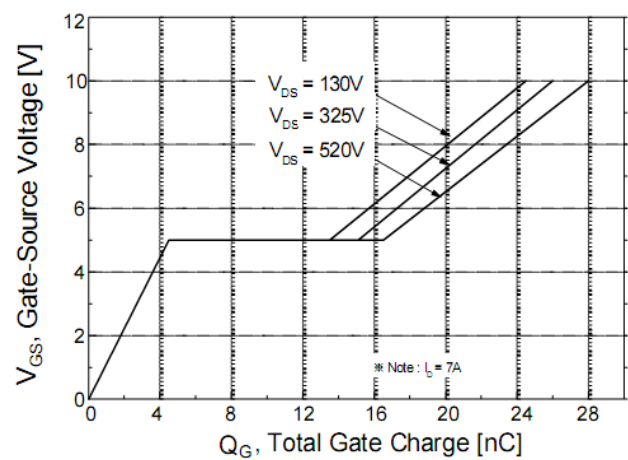


Figure 6. Gate Charge Characteristics

Typical Characteristics

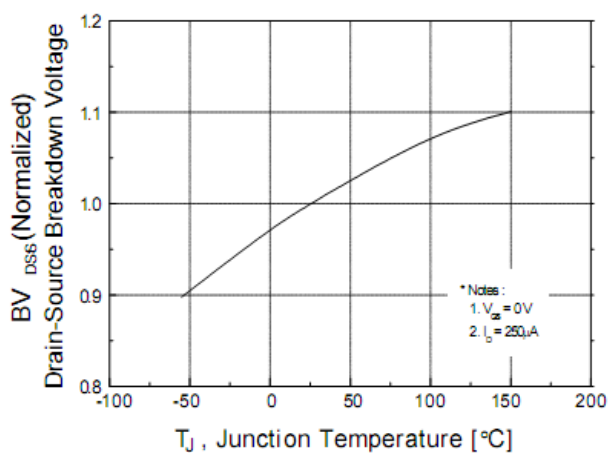


Figure 7. Breakdown Voltage Variation vs Temperature

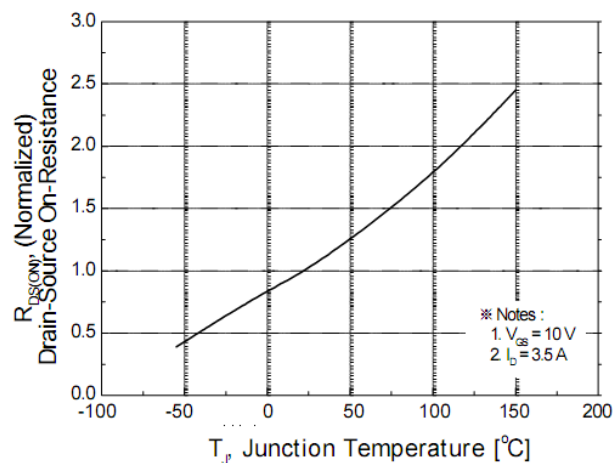


Figure 8. On-Resistance Variation vs Temperature

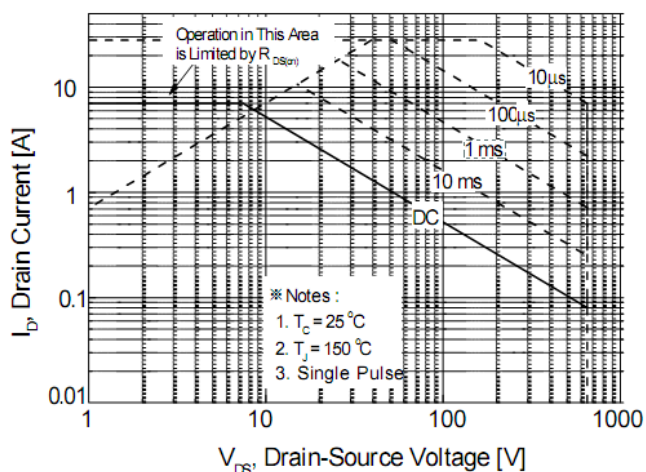


Figure 9. Safe Operating Area

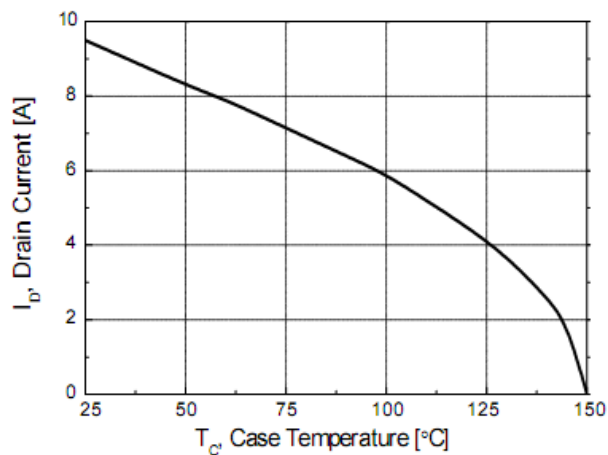


Figure 10. Maximum Drain Current vs Case Temperature

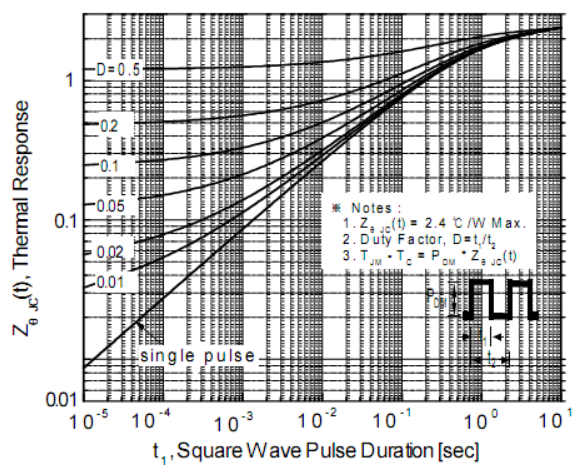


Figure 11. Transient Thermal Response Curve

Package Dimensions

Symbol	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.50	4.90	0.177	0.193
A1	2.34	2.74	0.092	0.108
A2	2.66	2.86	0.105	0.113
b	0.75	0.85	0.030	0.033
b1	1.24	1.44	0.049	0.057
c	0.40	0.60	0.016	0.024
D	10.00	10.32	0.394	0.406
E	15.75	16.05	0.620	0.632
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
F	3.10	3.5	0.122	0.138
L	12.90	13.50	0.508	0.531
L1	2.90	3.30	0.114	0.130
Φ	3.10	3.30	0.122	0.130