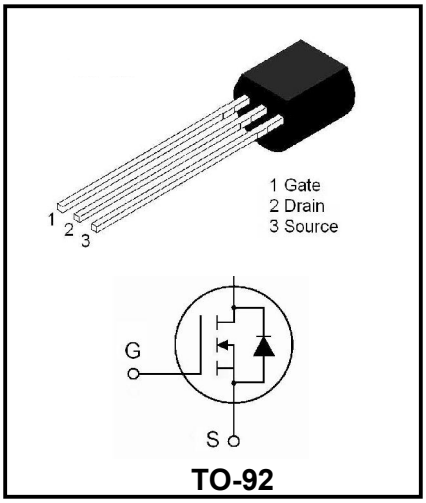
650V N-Channel Power MOSFET

MAIN CHARACTERISTICS

I_D	1A
V_{DSS}	650V
R_{DSON}-typ(@V_{GS}=10V)	＜12.5Ω



TO-92

General Description

The 1N65 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

Features

- Fast Switching Capability
- Avalanche Energy Specified
- Improved dv/dt Capability, High Ruggedness

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

Parameter		Symbol	Ratings	Units
Gate-Drain Voltage		BV_{DSS}	650	V
Gate-Source Voltage		BV_{GSS}	±30	V
Continuous Drain Current		I_D	1.2	A
Pulsed Drain Current		I_{DM}	4.8	A
Avala nche En ergy	Sin gle Pulsed (Note3)	E_{AS}	50	mJ
	Repetitive (Note 2)	E_{AR}	4.0	
Peak Diode Recovery (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	1	W
Operation Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{STG}	-55~150	°C
Junction to ambient		$R_{\theta JA}$	140	°C/W

Note:

1.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.

2.Repetitive Rating : Pulse width limited by maximum junction temperature

3.L= 60mH, I_{AS} =1A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 **°C**

4.I_{SD} ≤ 1.2A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J= 25 **°C**

Electrical Characteristics (TC=25°C Unless otherwise noted)

Parameter	Test Conditions	Symbol	Min.	Typ	Max.	Units
Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250μA	BV_{DSS}	650			V
Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	$\Delta BV_{DSS}/\Delta T_J$		0.4		V/ °C
Zero Gate Voltage Drain Current	V_{DS}= 600V, V_{GS}= 0V	I_{DSS}			10	μA
Gate Leakage Current	V_{DS}=0V,V_{GS} = ±30V	I_{GSS}			±100	nA
Gate Threshold Voltage	V_{DS}=V_{GS},I_D= 250μA	$V_{GS(th)}$	2		4	V
Drain-source On-Resistance	V_{GS} = 10V, I_D = 0.6A	$R_{DS(ON)}$			12.5	Ω
Input Capacitance	V_{DS} = 25V,V_{GS} = 0V, f = 1.0MHz	Ciss		120		pF
Output Capacitance		Coss		20		
Reverse Transfer Capacitance		Crss		3.0		
Turn-On DelayTime	V_{DS} = 325V, I_D=1.2A V_{GS} = 10V,R_G = 50Ω (Note 6,7)	$t_{d(on)}$		5		nS
Turn-On Rise Time		t_r		25		
Turn-Off DelayTime		$t_{d(off)}$		7		
Turn-Off Fall Time		t_f		25		
Total Gate Charge	V_{DS} = 520V, I_D = 1.2A, V_{GS}= 10V, R_G=3.3kΩ (Note 6,7)	Q_g		5.0		nC
Gate-Source Charge		Q_{gs}		1.0		
Gate-Drain Charge		Q_{gd}		2.6		
Diode Forward Voltage	V_{GS}=0V,I_S = 1.2 A	V_{SD}			1.4	V
Diode Forward Current		I_S			1.2	A
Pulsed Diode Forward Current		I_{SM}			4.8	A
Reverse Recovery Time	V_{GS} = 0V, I_S = 1.2A dI_F/dt =100A/μs (Note 5)	t_{rr}		160		ns
Reverse Recovery Charge		Q_{rr}		0.3		μC

Notes:
5.Repetitive Rating: Pulse width limited by maximum junction temperature
6.Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.
7.Essentially Independent of Operating Temperature

Test Circuits and Waveforms

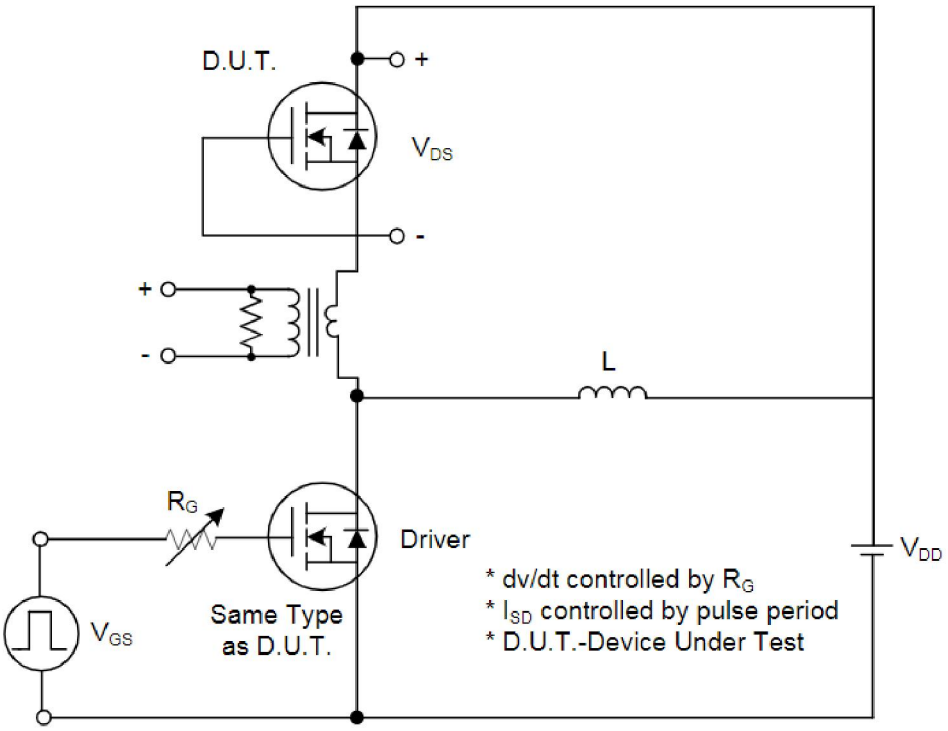


Figure 1. Peak Diode Recovery dv/dt Test Circuit

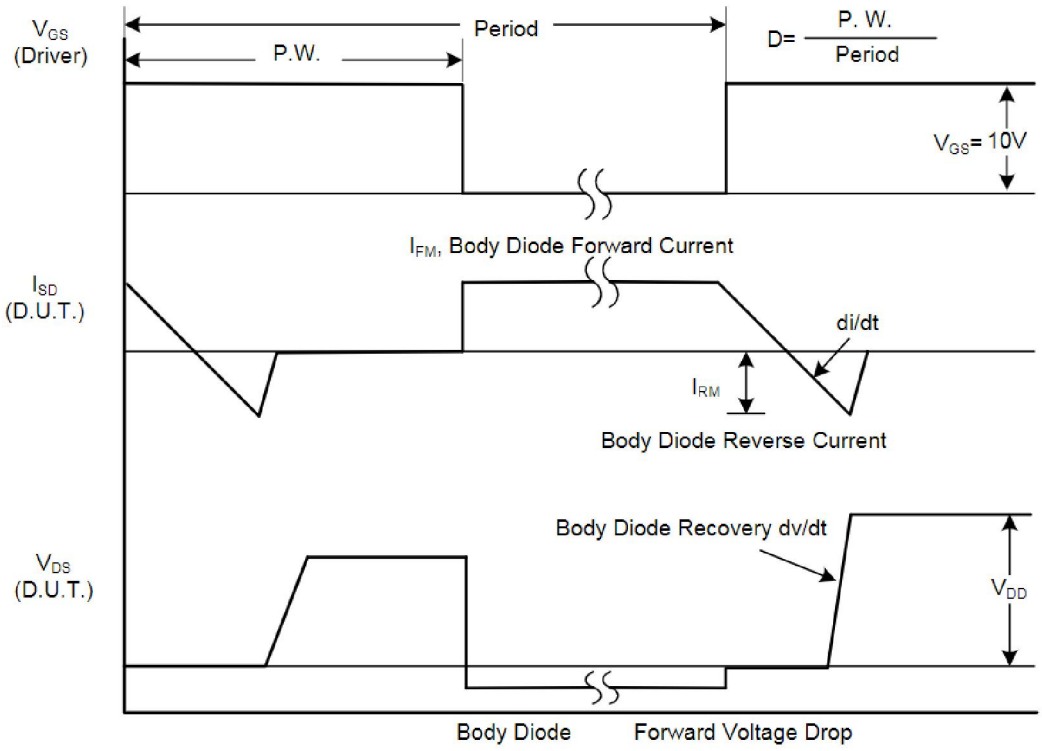


Figure 2. Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms

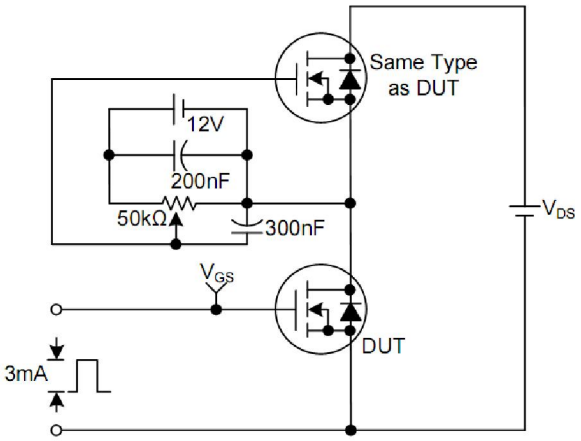


Figure 3. Gate Charge Test Circuit

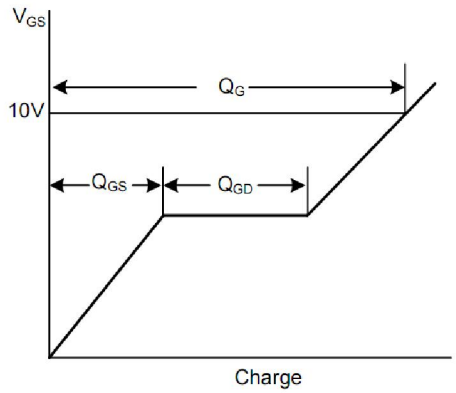


Figure 4. Gate Charge Waveforms

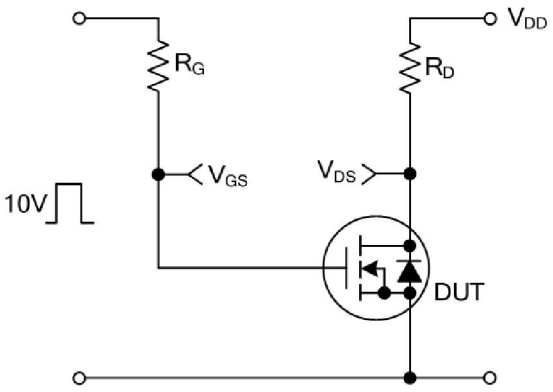


Figure 5. Resistive Switching Circuit

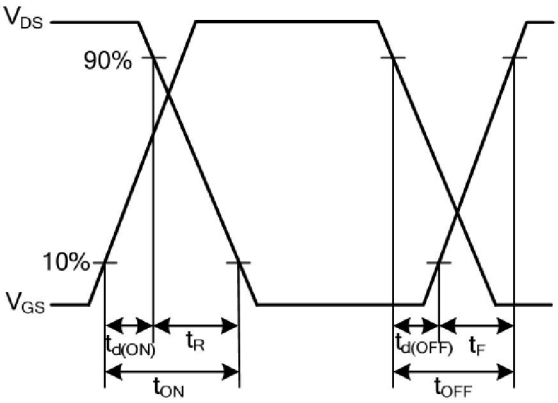


Figure 7. Resistive Switching Waveforms

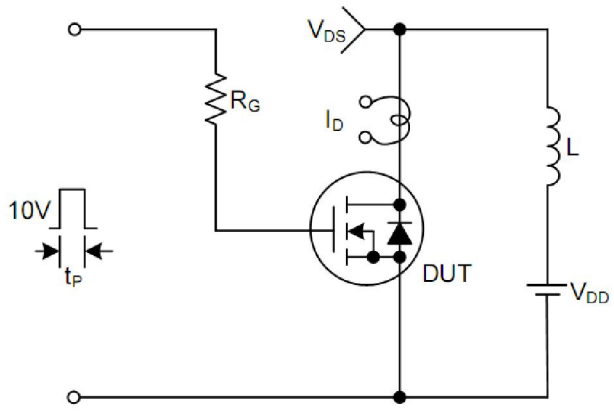


Figure 7. Unclamped Inductive Switching Test Circuit

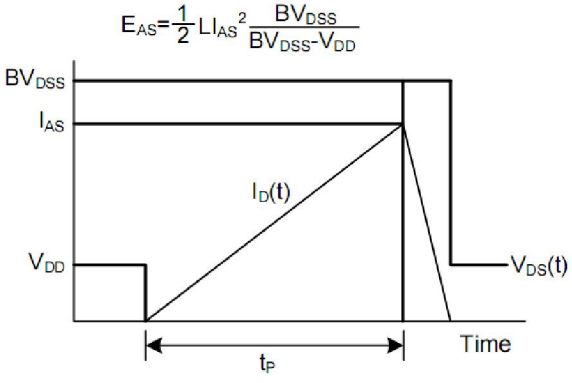


Figure 8. Unclamped Inductive Switching Waveforms

Typical Characteristics

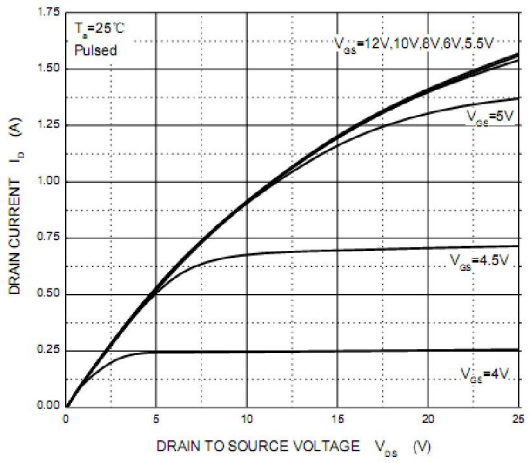


Figure 1. Output Characteristics

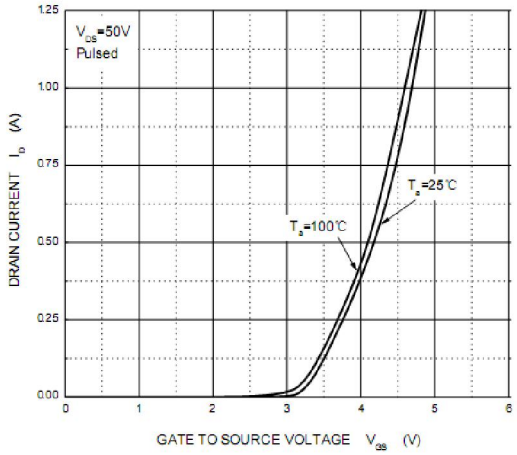


Figure 2. Transfer Characteristics

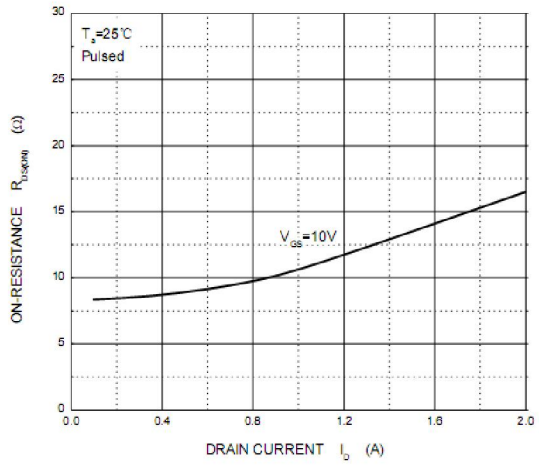


Figure 3 . Rdson vs. Drain Current

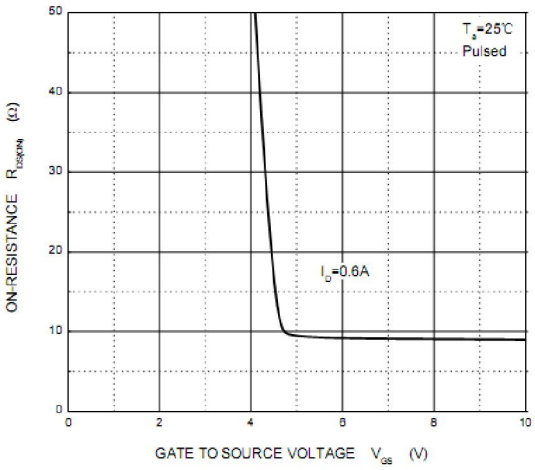


Figure 4. Rdson vs. Gase-Source Voltage

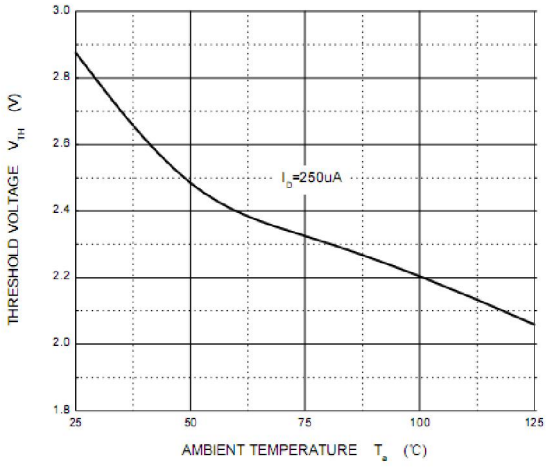


Figure 5. Threshold Voltage

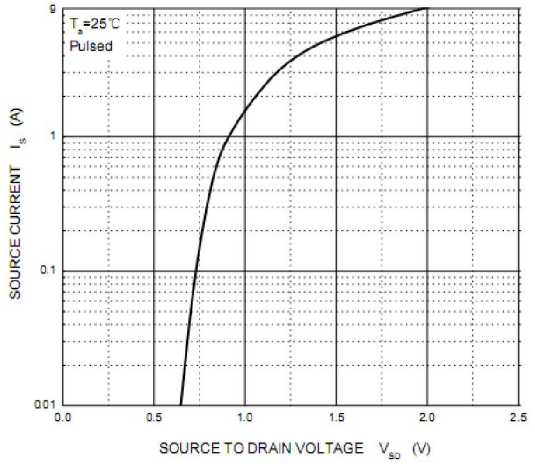


Figure 6. Source- Drain Diode Forward

Package Dimensions

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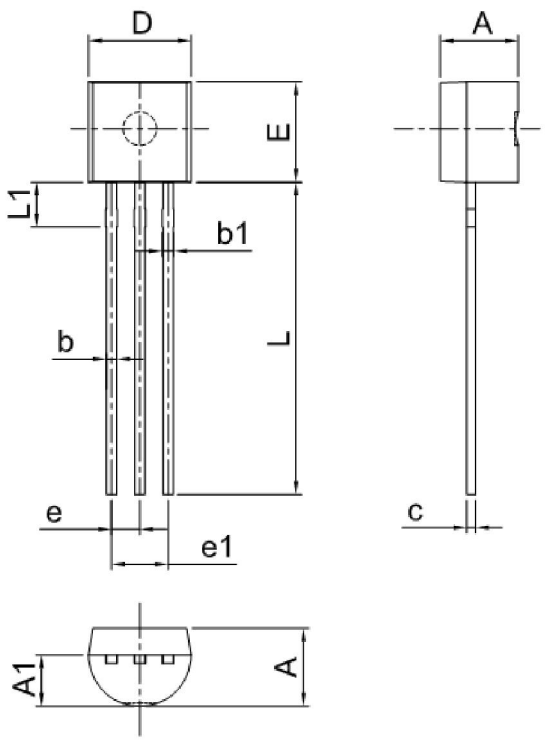

Symbol	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	3.30	3.70	0.130	0.146
A1	2.30	2.70	0.091	0.106
b	0.40	0.50	0.016	0.020
b1	0.50	0.70	0.020	0.028
c	0.35	0.45	0.014	0.018
D	4.45	4.70	0.175	0.185
E	4.40	4.65	0.173	0.183
e	1.17	1.37	0.046	0.054
e1	2.34	2.64	0.092	0.104
L	13.50	14.50	0.531	0.571
L1	1.80	2.20	0.071	0.087

Package	Packing Method	Pack uantity
TO-92	Bulk	1000pcs/Bag
TO-92	Tape	2000pcs/Box

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