

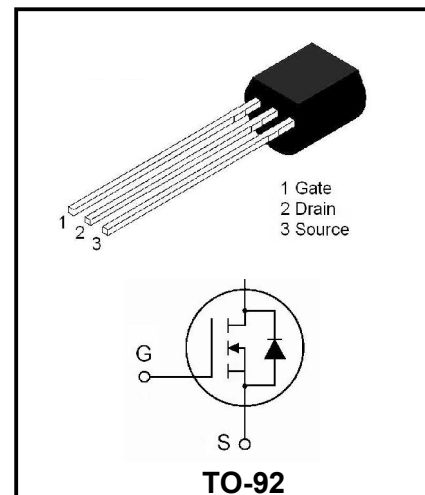
650V N-Channel Power MOSFET

MAIN CHARACTERISTICS

I_D	1A
V_{DSS}	650V
$R_{DS(on)-typ}(@V_{GS}=10V)$	$<12.5\Omega$

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 ($T_c=25^\circ\text{C}$, 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
Avalanche Energy	Single 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	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-55~150	$^\circ\text{C}$
Junction to ambient		$R_{\theta JA}$	140	$^\circ\text{C/W}$

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. $L=60\text{mH}$, $I_{AS}=1\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
4. $I_{SD}\leq 1.2\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

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

Parameter	Test Conditions	Symbol	Min.	Typ	Max.	Units
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	650			V
Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, 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	$V_{DS}=0V, V_{GS}= \pm 30V$	I_{GSS}			± 100	nA
Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D= 250\mu A$	$V_{GS(th)}$	2		4	V
Drain-source On-Resistance	$V_{GS}= 10V, I_D= 0.6A$	$R_{DS(ON)}$			12.5	Ω
Input Capacitance	$V_{DS}= 25V, V_{GS}= 0V$, $f = 1.0MHz$	C_{iss}		120		pF
Output Capacitance		C_{oss}		20		
Reverse Transfer Capacitance		C_{rss}		3.0		
Turn-On DelayTime	$V_{DS}= 325V, I_D=1.2A$ $V_{GS}= 10V, R_G= 50\Omega$ (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	$V_{DS}= 520V, I_D= 1.2A$, $V_{GS}= 10V, R_G=3.3k\Omega$ (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	$V_{GS}= 0V, I_S= 1.2A$ $di_F/dt =100A/\mu s$ (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 $\leq 300\mu s$, duty cycle $\leq 2\%$.

7.Essentially Independent of Operating Temperature

Test Circuits and Waveforms

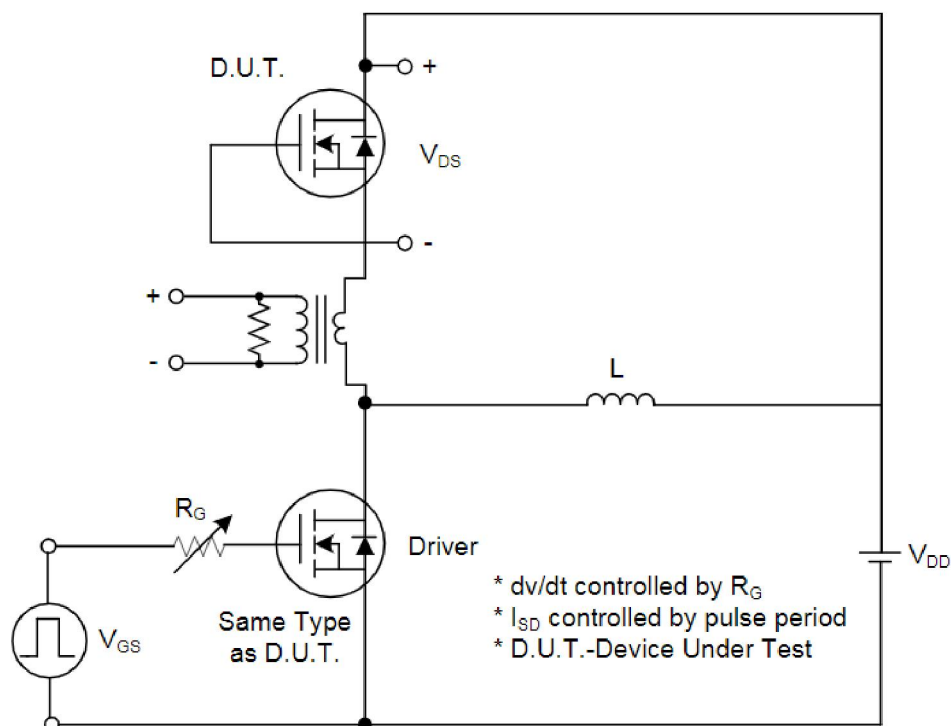


Figure 1. Peak Diode Recovery dv/dt Test Circuit

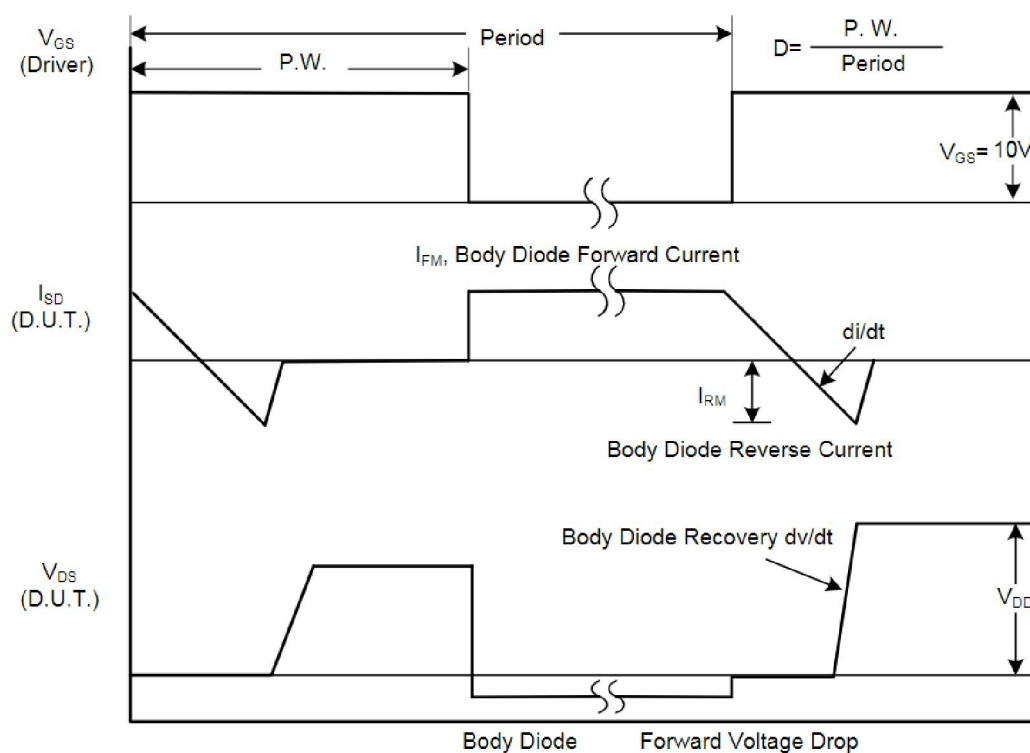


Figure 2. Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms

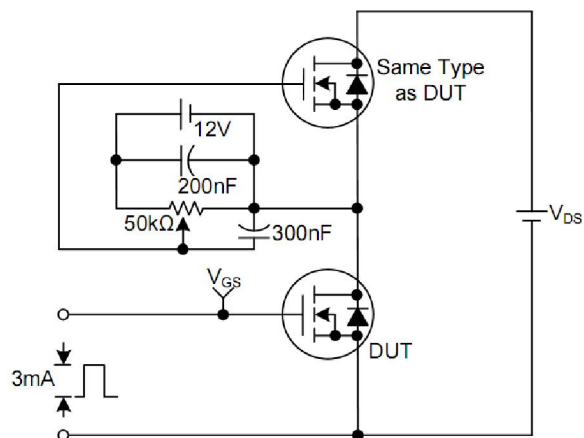


Figure 3. Gate Charge Test Circuit

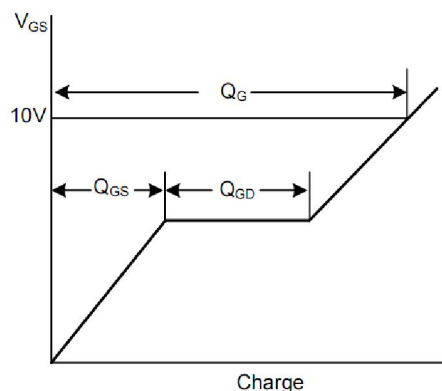


Figure 4. Gate Charge Waveforms

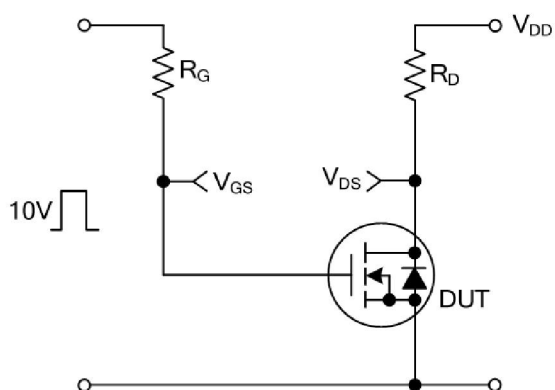


Figure 5. Resistive Switching Circuit

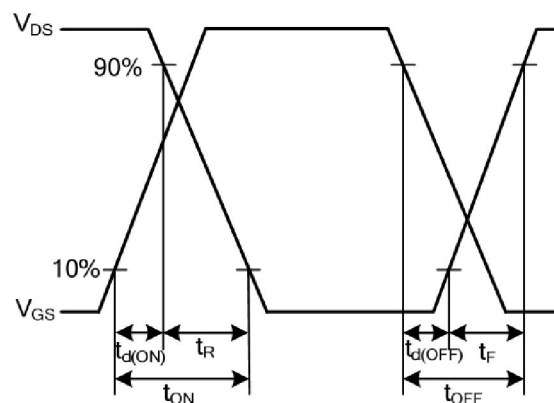


Figure 7. Resistive Switching Waveforms

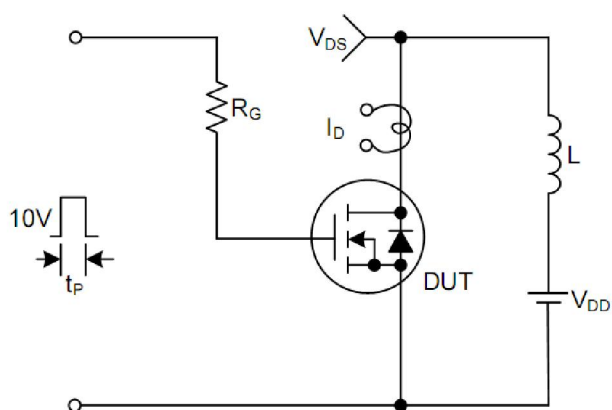


Figure 7. Unclamped Inductive Switching Test Circuit

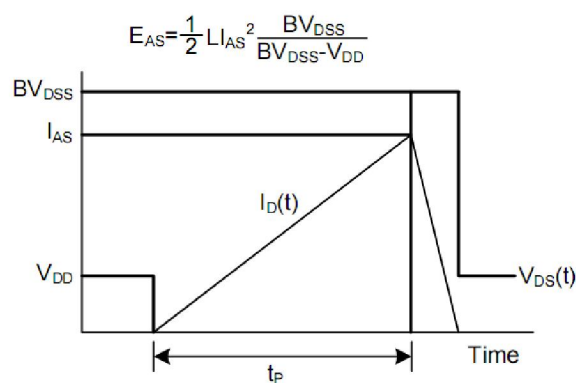


Figure 8. Unclamped Inductive Switching Waveforms

Typical Characteristics

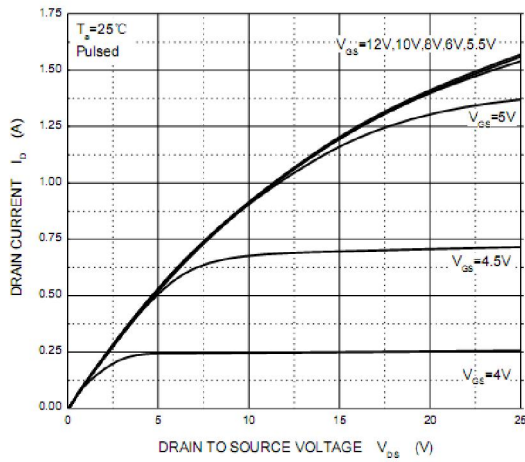


Figure 1. Output Characteristics

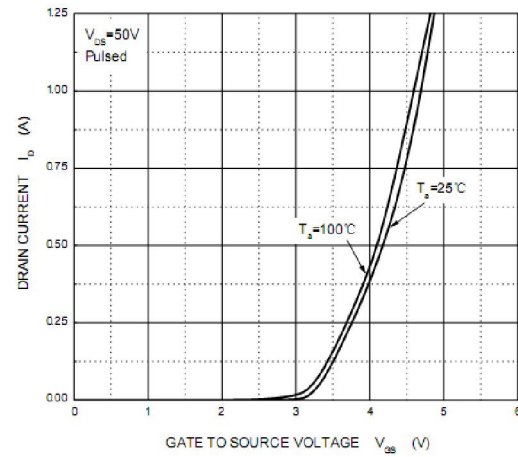


Figure 2. Transfer Characteristics

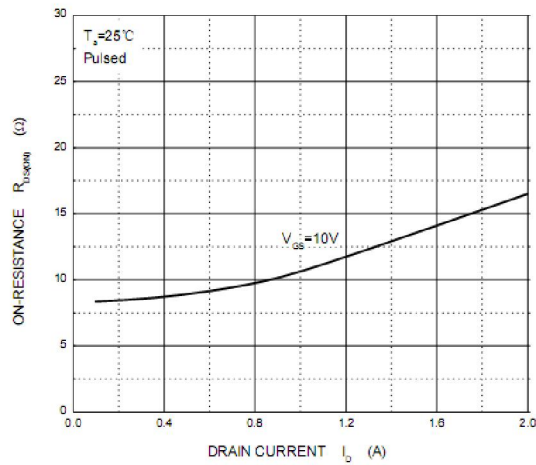


Figure 3 . Rdson vs. Drain Current

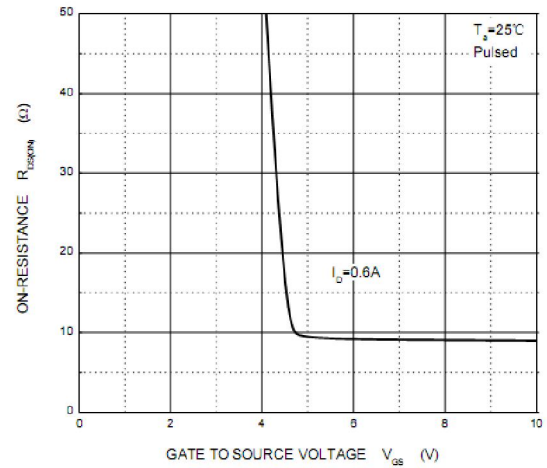


Figure 4. Rdson vs. Gate-Source Voltage

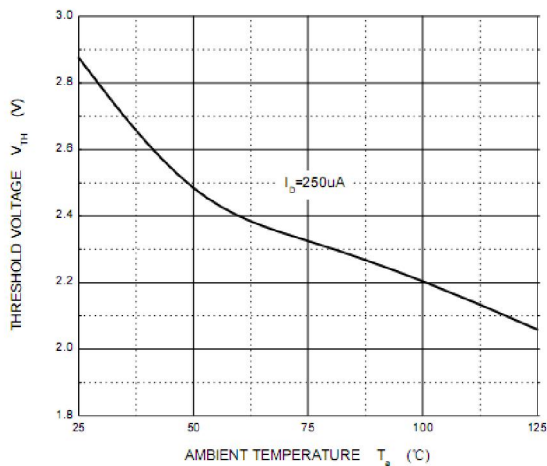


Figure 5. Threshold Voltage

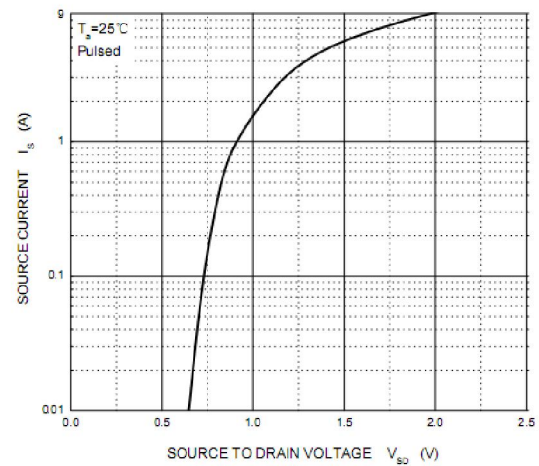
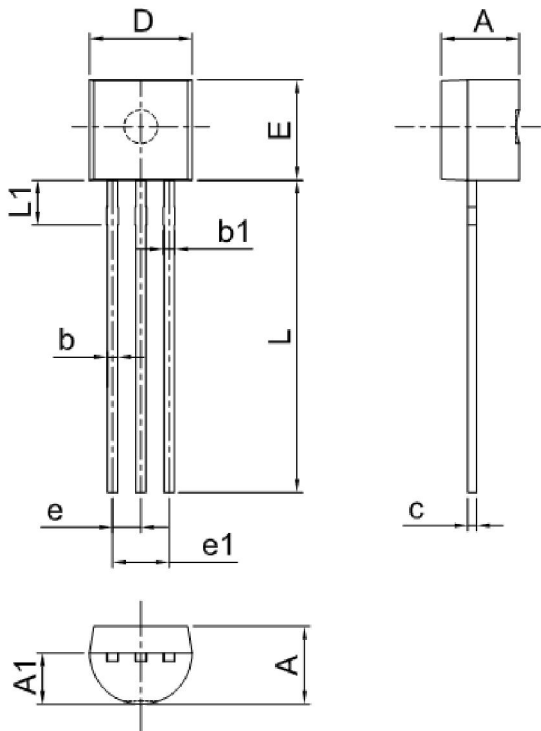


Figure 6. Source- Drain Diode Forward

Package Dimensions

TO-92

	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