

TS4N65

4.0Amps, 650V N-Channel Power Mosfet

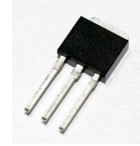
DRAWING

Features

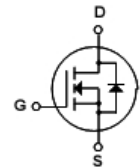
- ◆ 4.0A, 650V, $R_{DS(on)} = 3.0\Omega @ V_{GS} = 10V$
- ◆ Low gate charge
- ◆ Fast switching capability
- ◆ Avalanche energy specified
- ◆ Improved dv/dt capability

General Description

- ◆ Package: TO-220AB
- ◆ The TS4N65 N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.



G D S



Absolute Maximum Ratings

Symbol	Parameter	Spec	Units
V_{DSS}	Drain-Source Voltage	650	V
I_D	Drain Current -Continuous($T_c=25^\circ C$)	4.0	A
	Drain Current -Continuous($T_c=100^\circ C$)	2.5	
I_{DM}	Drain Current -Pulsed (Note 2)	16	A
V_{GSS}	Gate-Source Voltage	± 30	V
P_D	Power Dissipation($T_c=25^\circ C$)	75	W
	Derate above $25^\circ C$	0.6	
E_{AS}	Single Pulsed Avalanche Energy	240	mJ
I_{AR}	Avalanche Current	4	A
E_{AR}	Repetitive Avalanche Energy	10	mJ
dv/dt	Peak Diode Recovery dv/dt	5.5	V/ns
T_j	Junction Temperature	+150	$^\circ C$
T_{opr}	Operating Temperature Range	-55 to +150	$^\circ C$
T_{stg}	Storage Temperature	-55 to +150	$^\circ C$

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. Pulse width limited by $T_{J(MAX)}$

3. $L = 16.8mH$, $I_{AS} = 5A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

4. $I_{SD} \leq 4.5A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	—	2.0	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	—	62.5	$^\circ C/W$

Electrical Characteristics($T_c=25^\circ C$ unless otherwise noted)

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	—	—	V
BV_{DSS}/T_J	Breakdown Voltage Temperature Coefficient	$ID=250\mu A$, Referenced to 25°C	—	0.6	—	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	—	—	10	μA
I_{GSSF}	Gate-Body Leakage Current Forward	$V_{GS}=30V, V_{DS}=0V$	—	—	100	nA
I_{GSSR}	Gate-Body Leakage Current Reverse	$V_{GS}=-30V, V_{DS}=0V$	—	—	-100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{GSTH}	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	—	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=2A$	—	3.00	3.85	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{jss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	—	280	—	pF
C_{oss}	Output Capacitance		—	40	—	pF
C_{rss}	Reverse Transfer Capacitance		—	5	—	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{don}	Turn-On Delay Time	$V_{DD}=300V$ $I_D=4.0A$ $R_G=25\Omega$ (Note 1.2)	—	10	—	ns
t_r	Turn-On Rise Time		—	25	—	ns
t_{doff}	Turn-Off Delay Time		—	20	—	ns
t_f	Turn-Off Fall Time		—	25	—	ns
Q_g	Total Gate Charge	$V_{DS}=480V$ $I_D=4.0A$ $V_{GS}=10V$	—	9	—	nc
Q_{gs}	Gate-Source Charge		—	1.8	—	nc
Q_{gd}	Gate-Drain Charge		—	4	—	nc

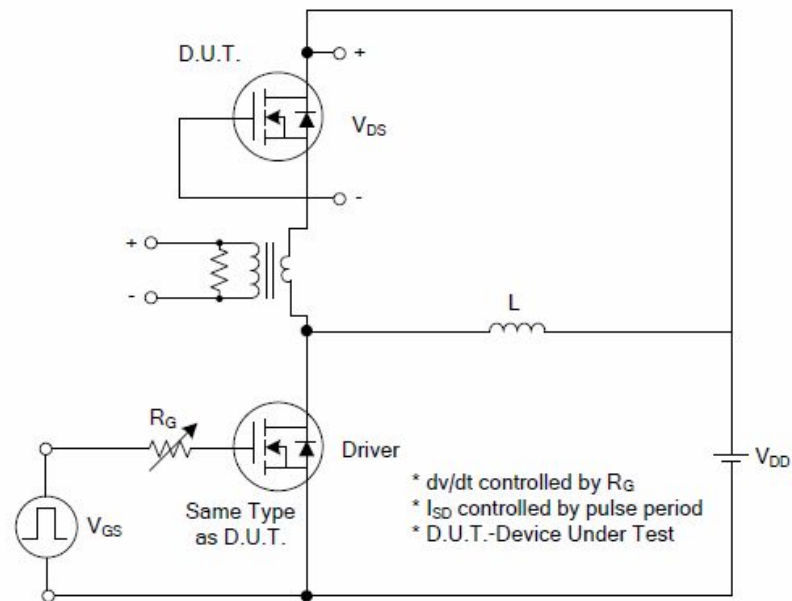
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_S	Maximum Continuous Drain-source diode forward current		—	—	2.0	A
I_{sm}	Maximum pulsed drain-source diode forward current		—	—	6	A
V_{sd}	Drain-source diode forward Voltage	$V_{GS}=0V, I_S=4A$	—	—	1.4	V
T_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=4A$ $di/dt=100A/\mu s$ (Note 1)	—	300	—	ns
Q_{rr}	Reverse Recovery charge		—	2.2	—	μC

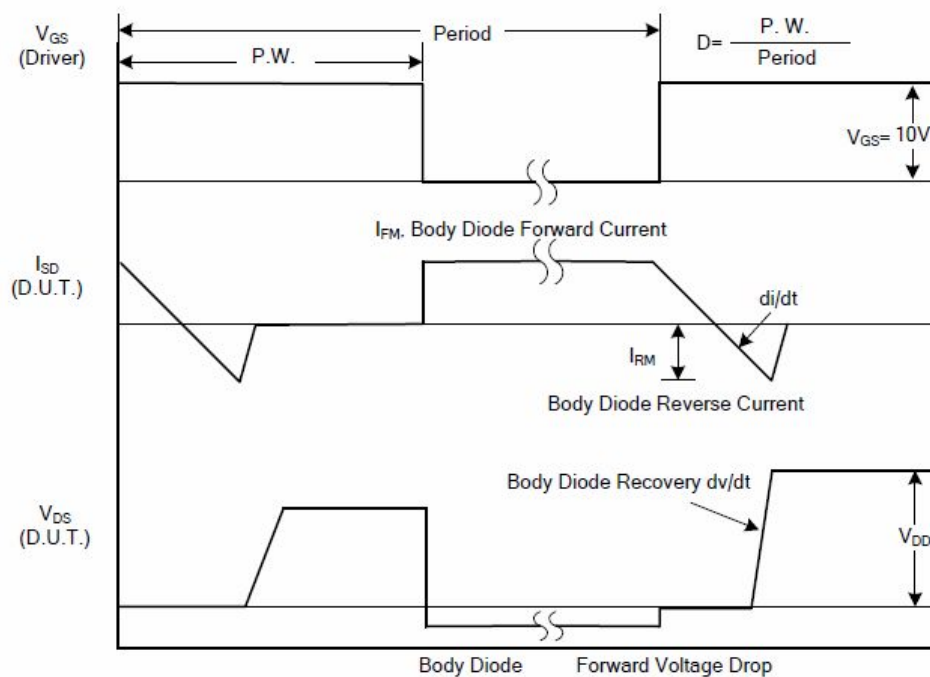
Notes : a. pulse test pulse width 300 μs , duty cycle 2% ,Guaranteed by design, not subject to production testing.

b. HOMSEMI reserves the right to improve product design functions and reliability without notice.

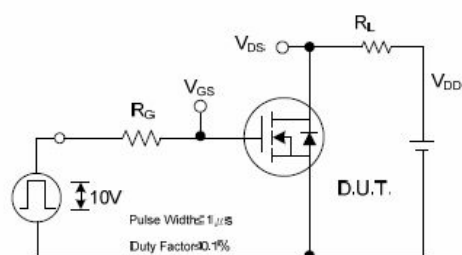
Test circuits and waveforms



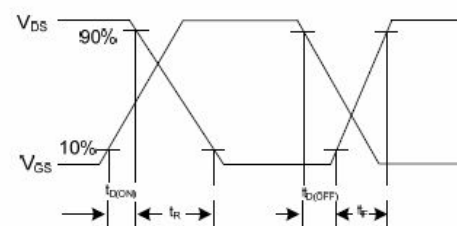
Peak Diode Recovery dv/dt Test Circuit



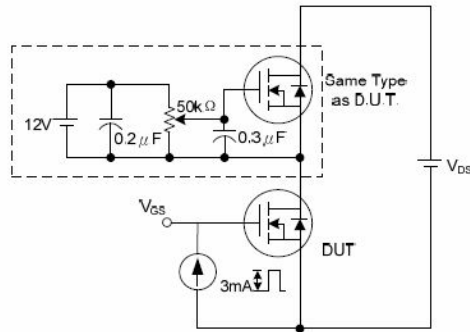
Peak Diode Recovery dv/dt Waveforms



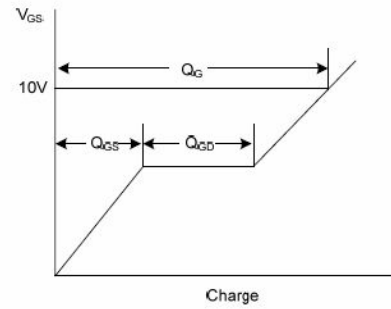
Switching Test Circuit



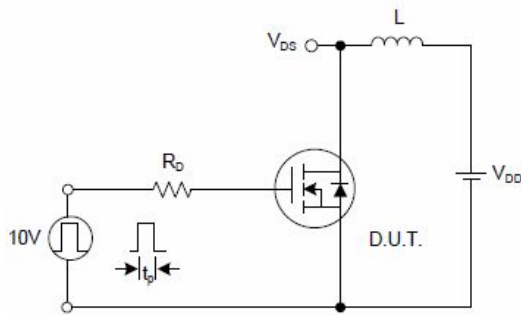
Switching Waveforms



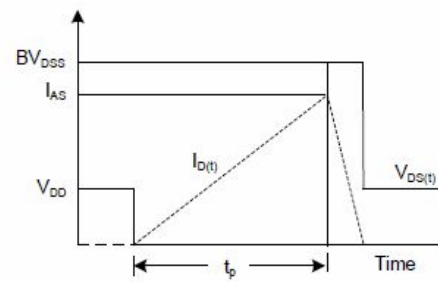
Gate Charge Test Circuit



Gate Charge Waveform

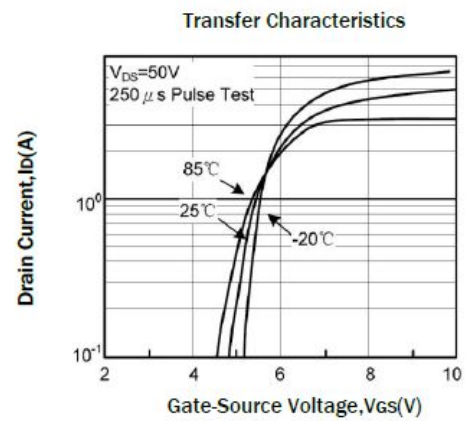
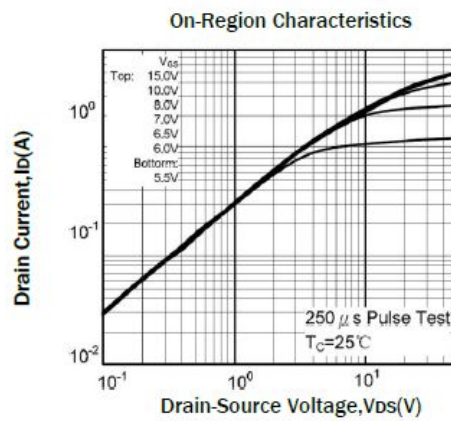


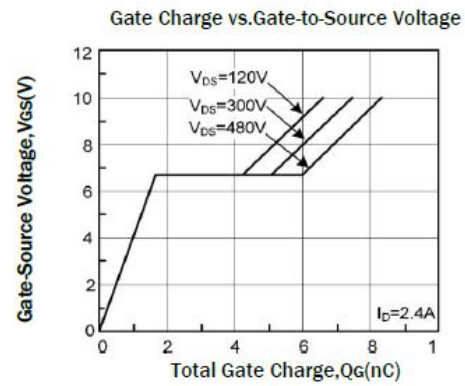
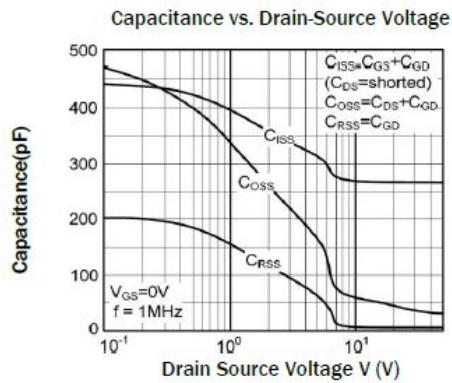
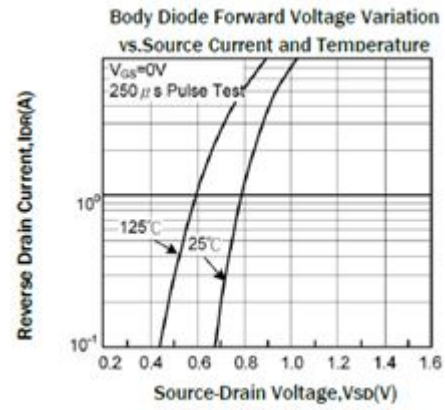
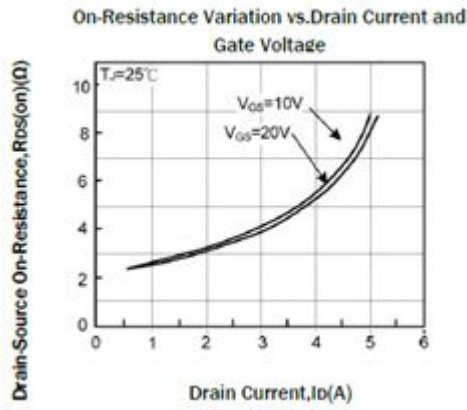
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Typical Characteristics





Mechanical Dimensions

