

TS5N65

5.0Amps, 650V N-Channel Power Mosfet

DRAWING

Features

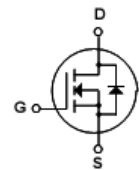
- ◆ 5.0A,650V, $R_{DS(on)}=2.5\Omega@V_{GS}=10V$
- ◆ Ultra low gate charge(typical 15nc)
- ◆ Low reverse transfer capacitance (C_{RSS} =typical 6.5 PF)
- ◆ Fast switching capability
- ◆ Avalanche energy specified
- ◆ Improved dv/dt capability, high ruggedness

General Description

- ◆ Package:TO-220C
- ◆ This is a high voltage and high current 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 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.



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($T_c=100^{\circ}C$)	2.9	A
I_{DM}	Drain Current -Pulsed (Note 2)	16	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	200	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 4)	4.5	V/ns
P_D	Power Dissipation	75	W
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	-	1.25	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	62.5	$^{\circ}C/W$

Electrical Characteristics(Tc=25°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 =250uA	650	—	—	V
BV _{DSS/TJ}	Breakdown Voltage Temperature Coefficient	ID=250uA, Referenced to 25°C	—	0.6	—	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650V, V _{GS} =0V	—	—	1	uA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} =20V, V _{DS} =0V	—	—	1	uA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} =-20V, V _{DS} =0V	—	—	-1	uA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V _{GSTH}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.0	—	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =2.0A	—	—	2.5	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1.0MHz	—	560	—	pF
C _{oss}	Output Capacitance		—	60	—	pF
C _{rss}	Reverse Transfer Capacitance		—	4.8	—	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t _{don}	Turn-On Delay Time	V _{DD} =325V I _D =4.0A R _G =25Ω (Note 1.2)	—	10	30	ns
t _r	Turn-On Rise Time		—	42	90	ns
t _{doff}	Turn-Off Delay Time		—	38	85	ns
t _f	Turn-Off Fall Time		—	46	100	ns
Q _g	Total Gate Charge	V _{DS} =520V	—	15	19	nc
Q _{gs}	Gate-Source Charge	I _D =4.0A	—	2.5	—	nc
Q _{gd}	Gate-Drain Charge	V _{GS} =10V (Note 1.2)	—	6.6	—	nc

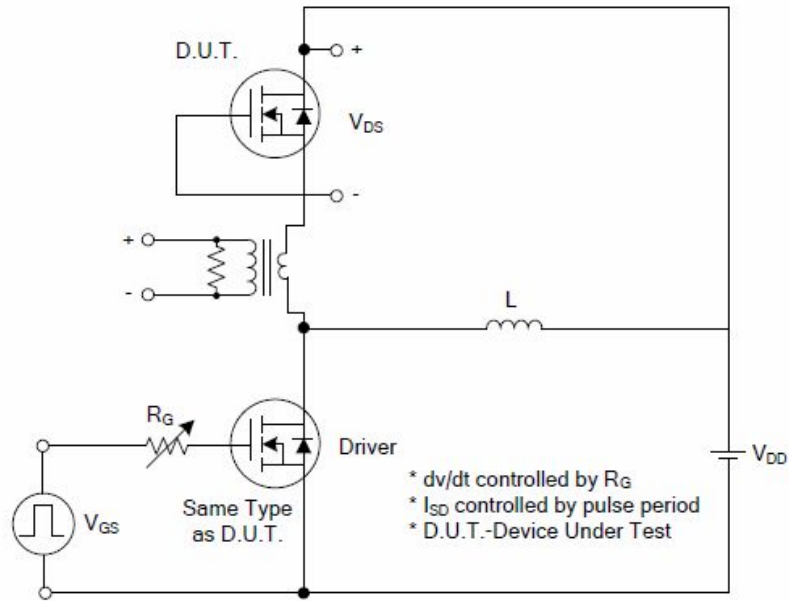
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I _s	Maximum Continuous Drain-source diode forward current		—	—	5.0	A
I _{sm}	Maximum pulsed drain-source diode forward current		—	—	20	A
V _{sd}	Drain-source diode forward Voltage	V _{GS} =0V, I _S =4A	—	—	1.5	V
T _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =4A	—	300	—	ns
Q _{rr}	Reverse Recovery charge	dif/dt=100A/us (Note 1)	—	2.2	—	uc

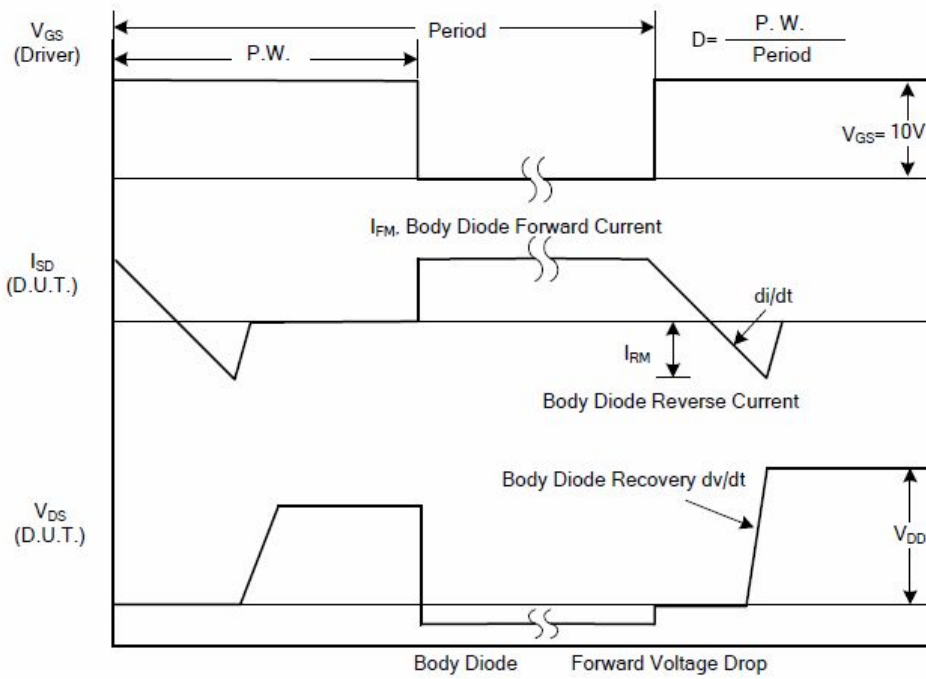
Note 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

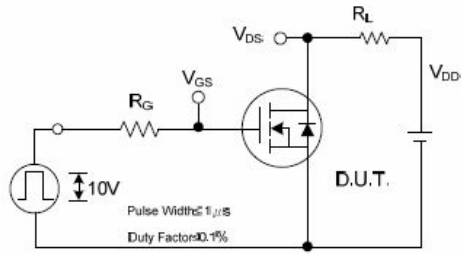
Test circuits and waveforms



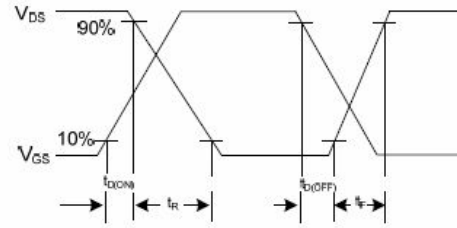
Peak Diode Recovery dv/dt Test Circuit



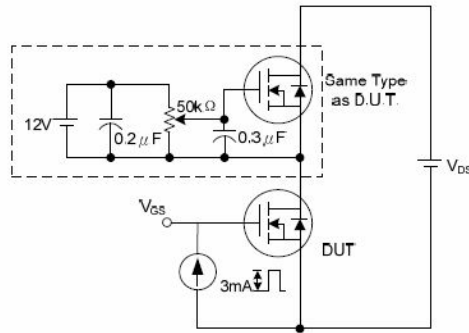
Peak Diode Recovery dv/dt Waveforms



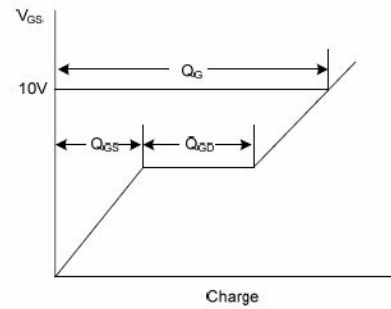
Switching Test Circuit



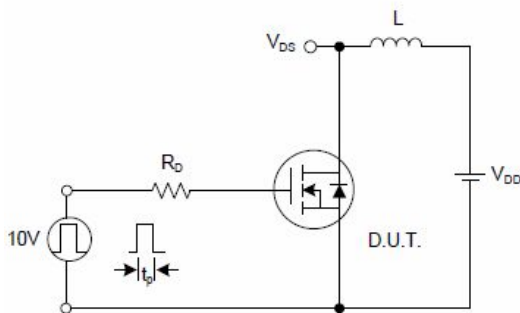
Switching Waveforms



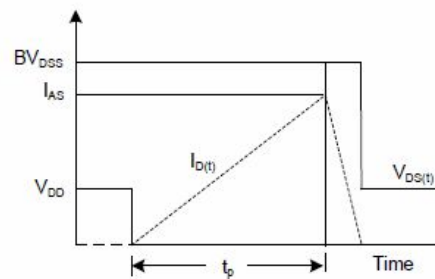
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Typical Characteristics

