

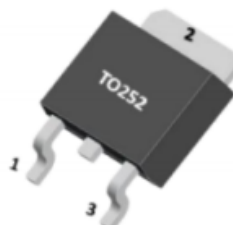
2N65

N-CHANNEL POWER MOSFET

2A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

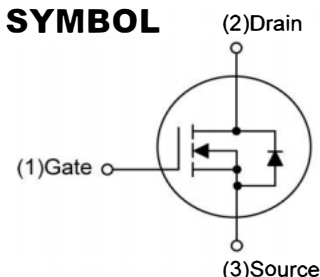
The 2N65 is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.



FEATURES

- * $R_{DS(ON)} \leq 6.0 \Omega$ @ $V_{GS} = 10V$, $I_D = 1.0A$
- * Ultra Low gate charge (typical 45nC)
- * Low reverse transfer capacitance ($CR_{SS} =$ typical 9 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



ABSOLUTE MAXIMUM RATINGS($T_A = 25^\circ C$, unless otherwise specified.)

SYMBOL	PARAMETER		VALUE	UNIT
V_{DS}	Drain-Source Voltage		650	V
V_{GS}	Gate Source Voltage		± 30	V
I_{AR}	Avalanche Current (Note 2)		2.0	A
I_D	Continuous Drain Current		2.0	A
I_{DM}	Pulsed Drain Current (Note 2)		8.0	A
E_{AS}	Avalanche Energy, Single Pulsed (Note 3)		0.2	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 4)		4.5	V/ns
P_D	Power Dissipation	TO-220F	21	W
		TO-252	28	W
T_J	Junction Temperature		150	$^\circ C$
T_{STG}	Storage Temperature		-55 to 150	$^\circ C$
T_{OPR}	Operating Temperature		-55 to 150	$^\circ C$

Notes: 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.



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2. Repetitive Rating : Pulse width limited by T_J.
3. L=0.5mH, I_{AS}=1.0A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD}≤2.4A, di/dt≤200A/μs, V_{DD} ≤ B_VD_{SS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θ _{JA}	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220F	θ _{JC}	5.95	°C/W
	TO-252		4.53	

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	V _(BR) DSS	V _{GS} =0V, I _D =250μA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔV _(BR) DSS/ΔT _J	I _D =250μA, Referenced to 25°C		0.4		V/°C
ON CHARACTERISTICS						
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =1.0A			6.0	Ω
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} ,I _D =250μA	2.4		4.0	V
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V,V _{DS} =25V f=1.0MHz			370	pF
Output Capacitance	C _{OSS}				50	
Reverse Transfer Capacitance	C _{RSS}				12	
SWITCHING CHARACTERISTICS						
Total gate charge	Q _g	V _{DS} =520V,V _{GS} =10V,I _D =2.4A (Note 1, 2)			55	nC
Gate-source charge	Q _{gs}					
Gate-drain charge	Q _{gd}					
Turn-On Delay Time	t _{d(on)}	V _{DD} =325V,I _D =2.4A R _G =25Ω (Note 1, 2)			50	nS
Turn-On Rise time	t _r				60	
Turn-Off Delay Time	t _{d(off)}				160	
Turn-Off Fall time	t _f				60	

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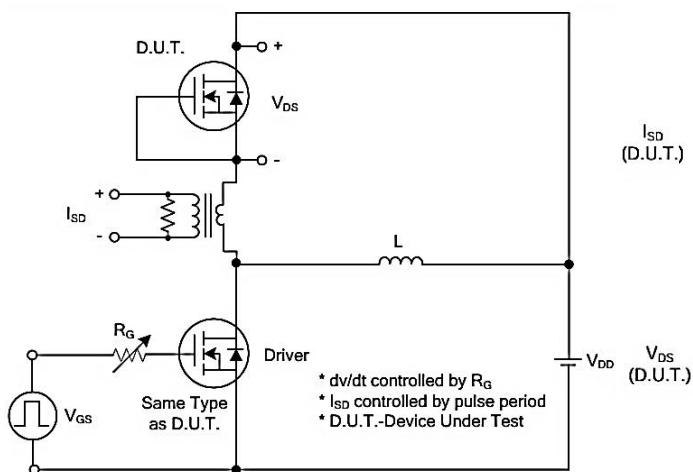
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain-Source Diode Forward Voltage	VSD	$V_{GS} = 0\text{ V}, I_S = 2.0\text{ A}$			1.4	V
Continuous Drain-Source Current	I_S				2.0	A
Pulsed drain-source diode forward current	I_{SM}				8.0	A
Reverse Recovery Time	t_{rr}	$I_S = 2.4\text{ A}, V_{GS} = 0\text{ V}$		180		ns
Reverse Recovery Charge	Q_{rr}	$dI/dt = 100\text{ A}/\mu\text{s}$ (Note 1)		0.72		μC

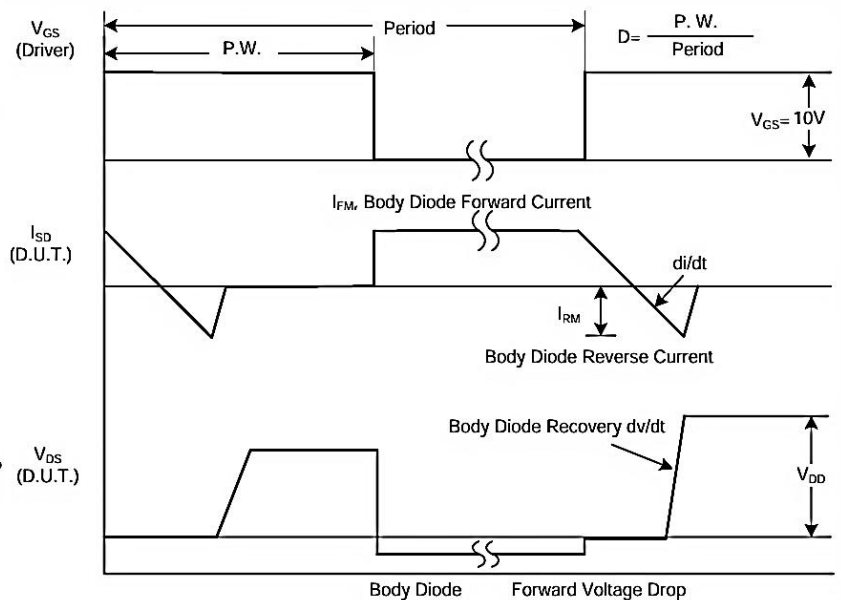
Notes:

1. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit

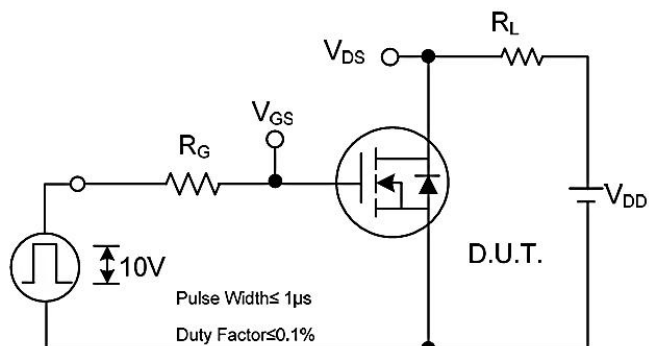


Peak Diode Recovery dv/dt Waveforms

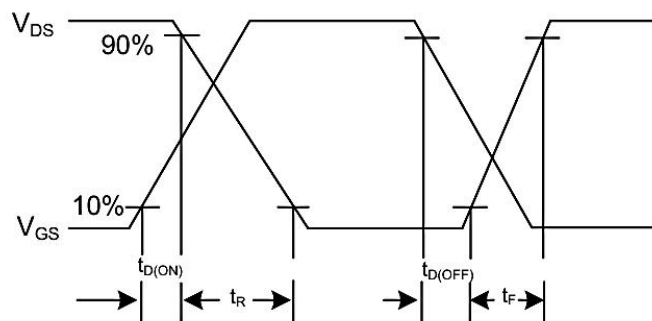
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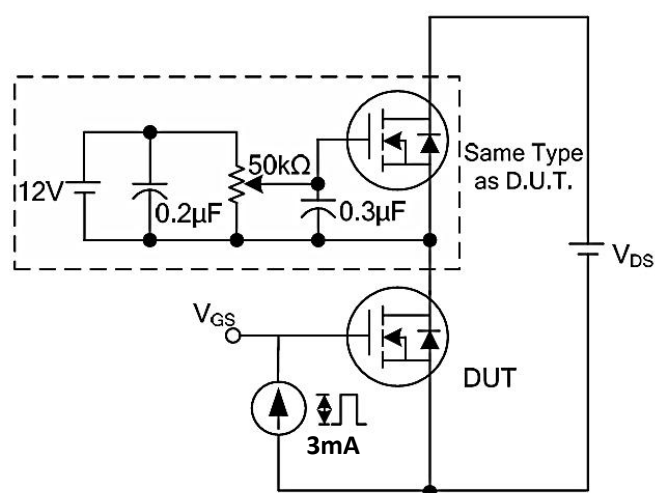
■ TEST CIRCUITS AND WAVEFORMS(Con.t)



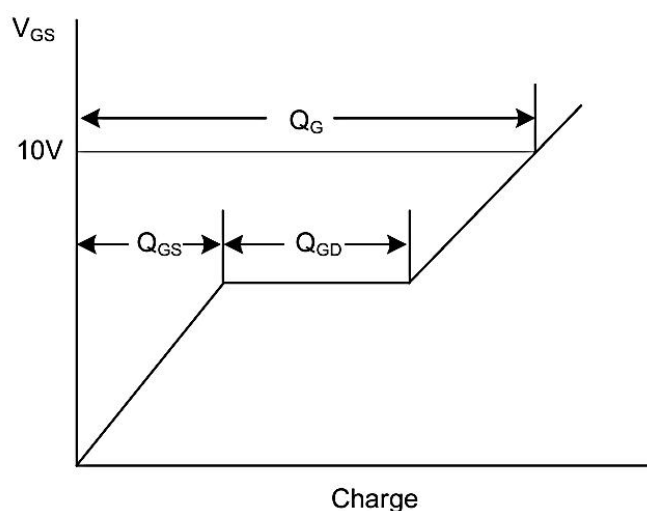
Switching Test Circuit



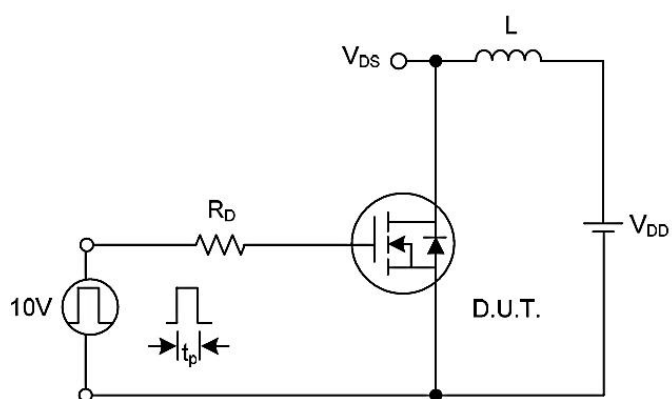
Switching Waveforms



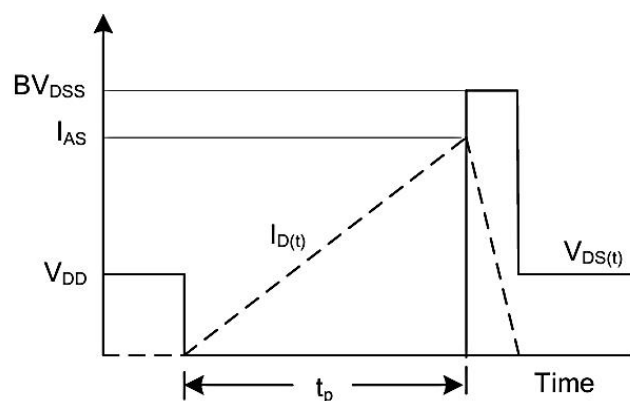
Gate Charge Test Circuit



Gate Charge Waveform

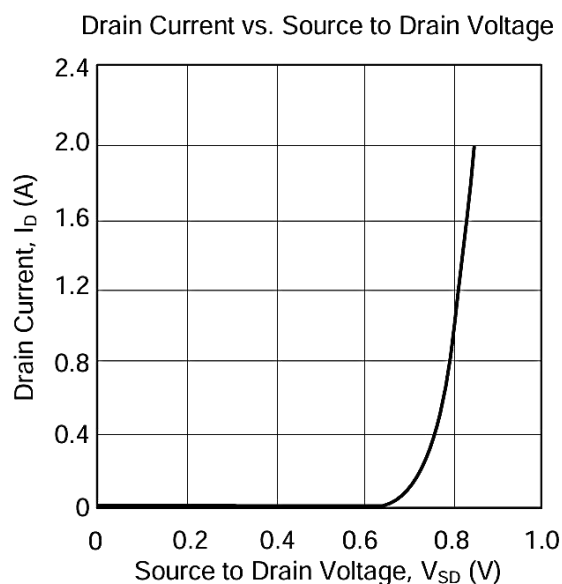
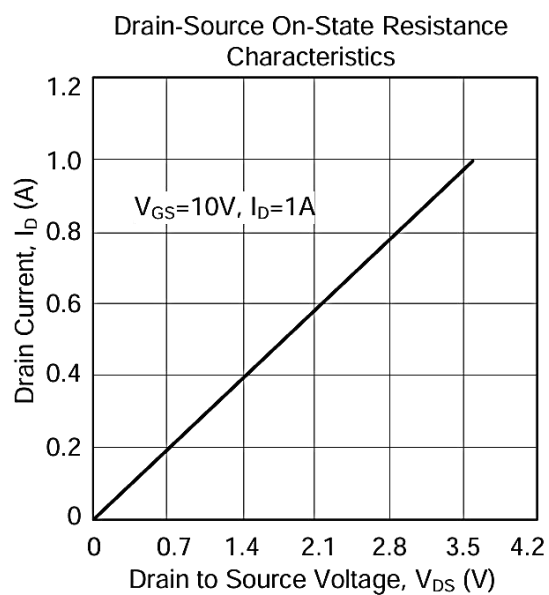
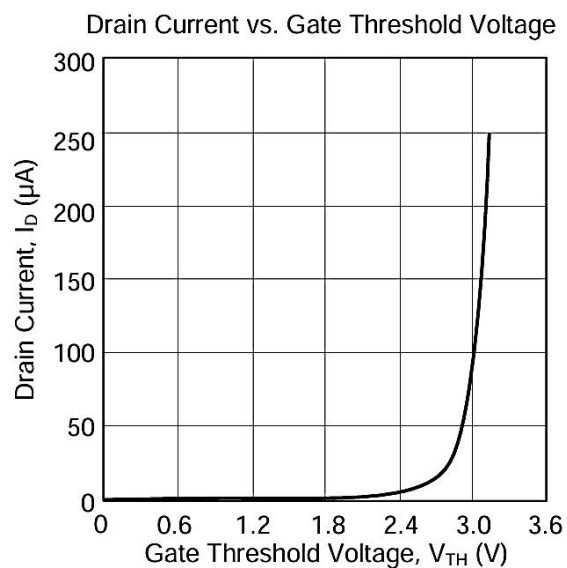
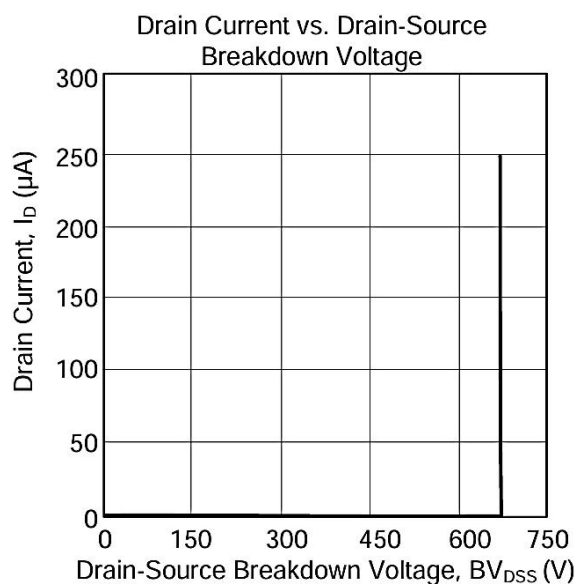


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

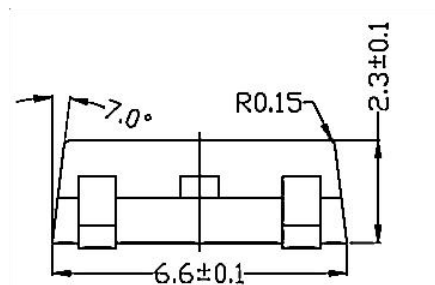
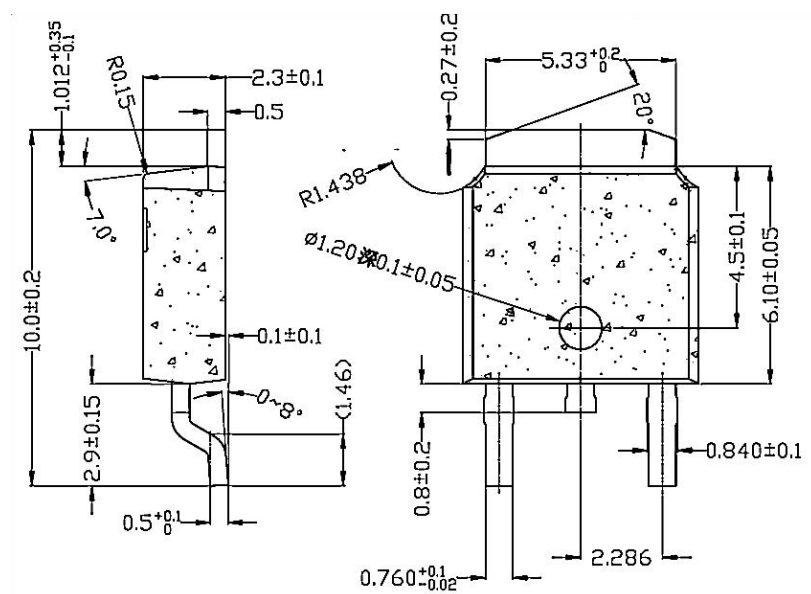
■ TYPICAL CHARACTERISTICS



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TO - 252 PACKAGE OUTLINE DIMENSIONS



TO - 252 PACKING INFORMATION

Package version	Reel dimensions $\Phi \times H$ (mm)	Per Reel (pcs)	Reels per box	Inner box dimensions $L \times W \times H$ (mm)	Outer box (pcs)	Outer box dimensions $L \times W \times H$ (mm)
TO-252	$\Phi 330 \times 20$	2500	2	360*340*50	25000	375*375*280