

# MS4N65

## N-Channel Enhancement Mode Power MOSFET

### Description

The MS4N65 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220AB package is universally preferred for all commercial-industrial applications

### Features

- BVDSS=650V typically @ Tj=150°C
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

### Application

- Open Framed Power Supply
- Adapter
- STB

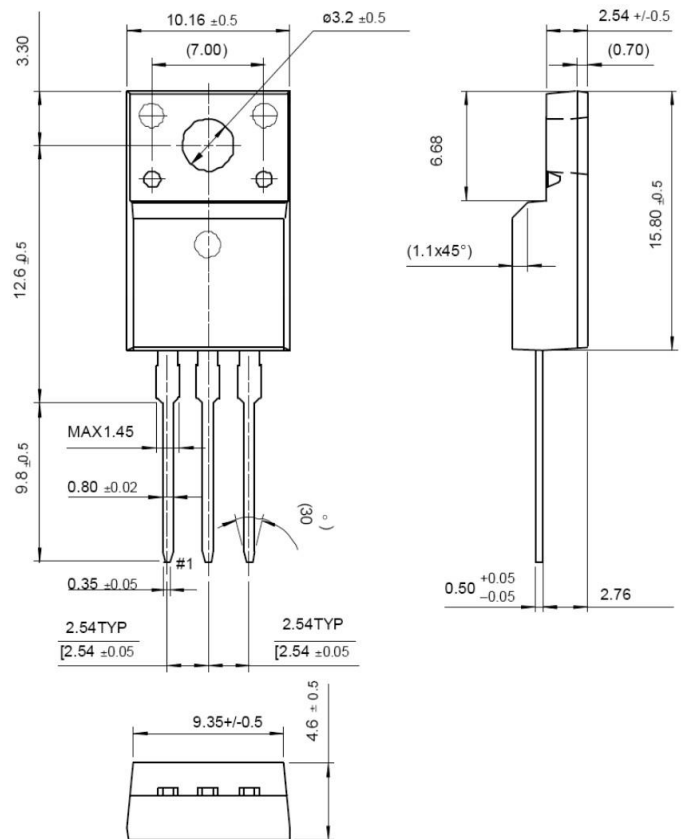
Package type : TO-220AB

### Packing & Order Information

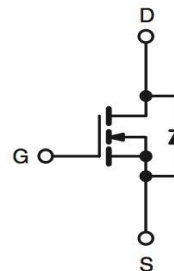
50/Tube ; 1,000/Box



**RoHS**  
COMPLIANT



Graphic symbol



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain to Source Voltage	650	V
V <sub>GS</sub>	Gate to Source Voltage	±30	V
I <sub>D</sub>	Continuous Drain Current (TC=25°C)	3.6	A
	Continuous Drain Current (TC=100°C)	2.3	A
I <sub>DM</sub>	Drain Current Pulsed	16.4	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy	240	mJ
E <sub>AR</sub>	Repetitive Avalanche Energy	10	mJ
dv/dt	Peak Diode Recovery dv/dt	5.5	V/ns

- Drain current limited by maximum junction temperature

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

Symbol	Parameter	Value	Unit
T <sub>L</sub>	TL Maximum Temperature for Soldering @ Lead at 0.125 in(0.318mm) from case for 10 seconds	300	°C
T <sub>PKG</sub>	TPKG Maximum Temperature for Soldering @ Package Body for 10 seconds	260	°C
P <sub>D</sub>	Total Power Dissipation(@TC = 25 °C) 100 W Derating Factor above 25 °C	100	W
		0.8	W/°C
T <sub>STG</sub>	Operating Junction Temperature	-55 to +150	°C
T <sub>J</sub>	Storage Temperature	150	°C

Note:

- 1.Repetitive rating; pulse width limited by maximum junction temperature.
2. I<sub>AS</sub>=4A, V<sub>DD</sub>=50V, L=8mH, V<sub>G</sub>=10V, starting T<sub>J</sub>=+25°C.
3. I<sub>SD</sub>≤4A, di/dt≤100A/μs, V<sub>DD</sub>≤BVDSS, starting T<sub>J</sub>=+25°C.

#### Thermal Characteristics

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
R <sub>θJC</sub>	Thermal Resistance,Junction-to-Case	--	--	1.25	°C/W
R <sub>θJA</sub>	Thermal Resistance,Junction-to-Ambient	--	--	62.5	°C/W

#### Static Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V , I <sub>D</sub> = 250μA	650	--	--	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250μA, Referenced to 25°C	--	0.6	--	V/°C
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 uA	2.0	--	4.0	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = 650 V , V <sub>GS</sub> = 0 V V <sub>DS</sub> = 520 V , T <sub>C</sub> = 125°C	--	--	1 10	uA nA
I <sub>GSS</sub>	Gate-Source Leakage,Forward	V <sub>GS</sub> = ±30	--	--	100	nA
R <sub>DSON</sub>	Static Drain-Source On-state Resis-tance	V <sub>GS</sub> = 10 V , I <sub>D</sub> = 1.8 A	--	2.4	2.9	Ω

#### Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 520 V , V <sub>GS</sub> = 10 V , I <sub>D</sub> = 3.6 A	--	15	20	nC
Q <sub>gs</sub>	Gate-Source Charge		--	2.8	--	nC
Q <sub>gd</sub>	Gate-Drain Charge (Miller Charge)		--	6.0	--	nC

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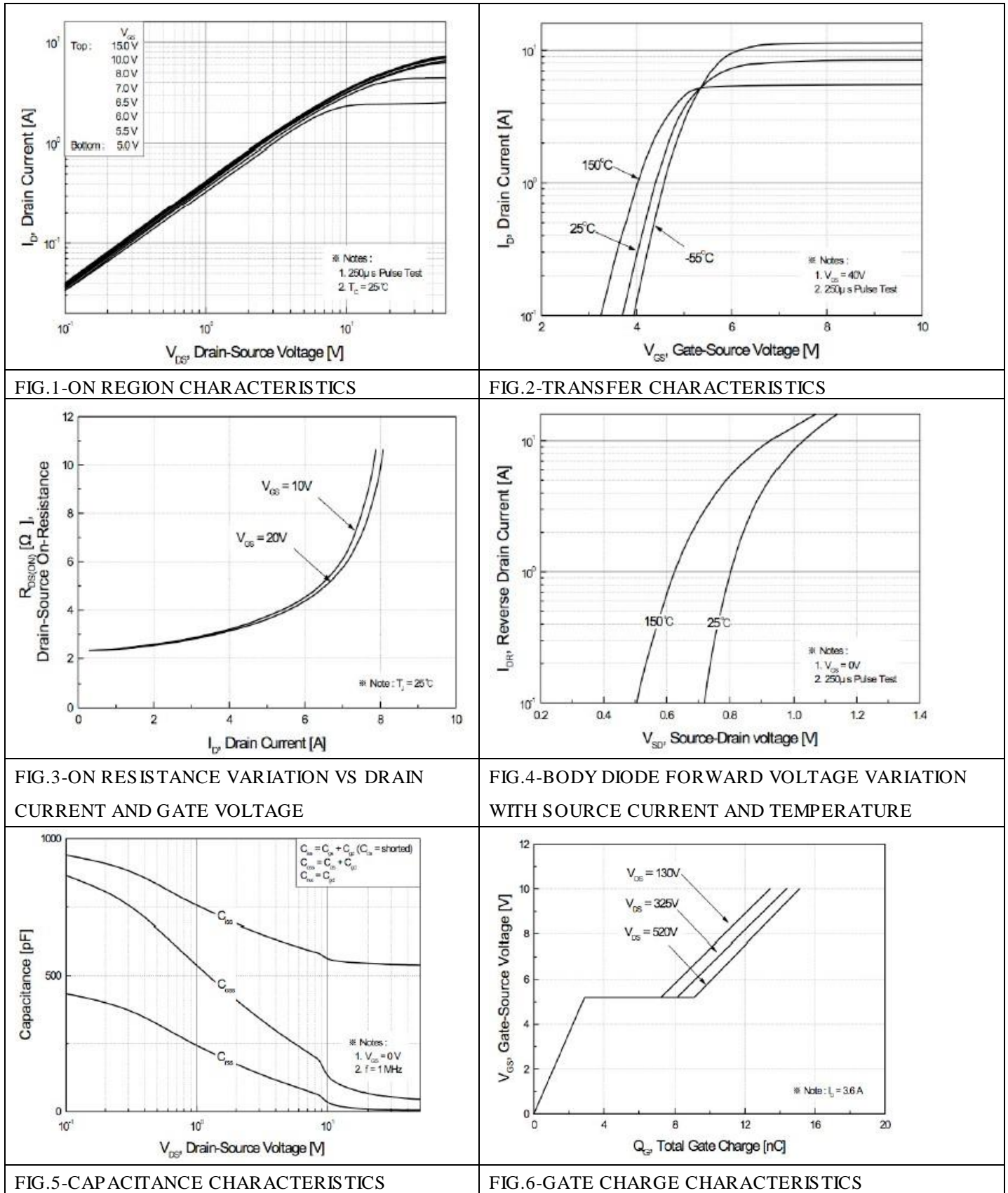
### N-Channel Enhancement Mode Power MOSFET

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325 \text{ V}$ , $I_D = 3.6 \text{ A}$ , $V_{GS} = 10 \text{ V}$ , $R_G = 25 \Omega$ , $R_D = 75 \Omega$	--	10	30	ns
$t_r$	Rise Time		--	35	80	ns
$t_{d(off)}$	Turn-Off Delay Time		--	45	100	ns
$t_f$	Fall Time		--	40	90	ns
$C_{ISS}$	Input Capacitance	$V_{GS} = 0 \text{ V}$ ,	--	560	--	pF
$C_{OSS}$	Output Capacitance	$V_{DS} = 25 \text{ V}$ ,	--	55	--	pF
$C_{RSS}$	Reverse Transfer Capacitance	$f = 1 \text{ MHz}$	--	7	--	pF

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### N-Channel Enhancement Mode Power MOSFET

#### Characteristics Curve



## MS4N65

### N-Channel Enhancement Mode Power MOSFET

#### Characteristics Curve

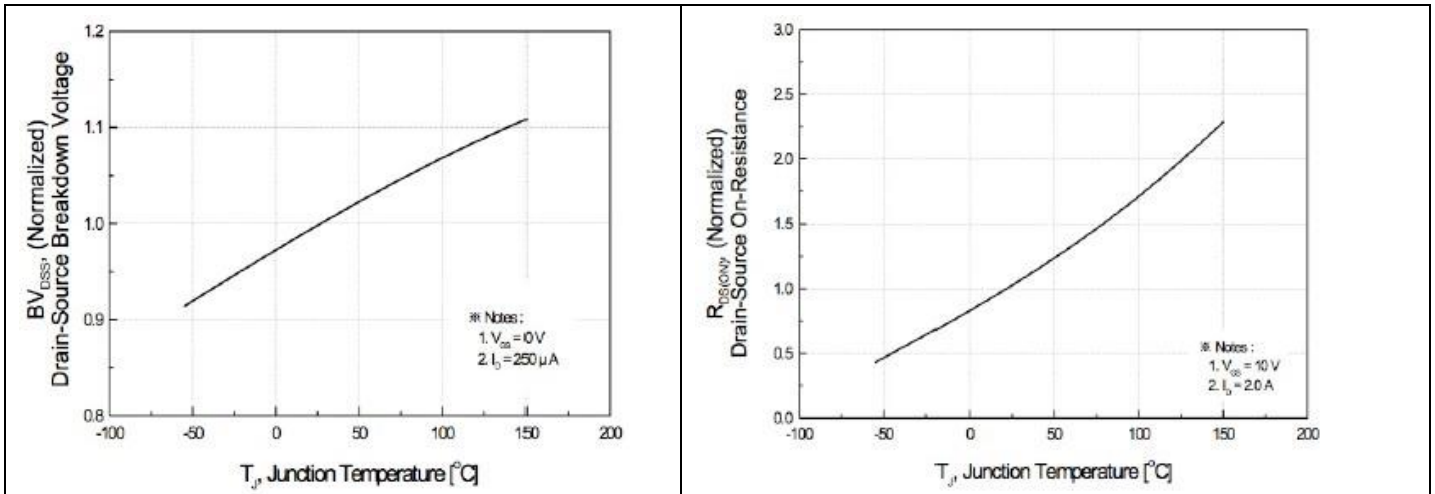


FIG. 7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

FIG. 8-ON-RESISTANCE VARIATION VS TEMPERATURE

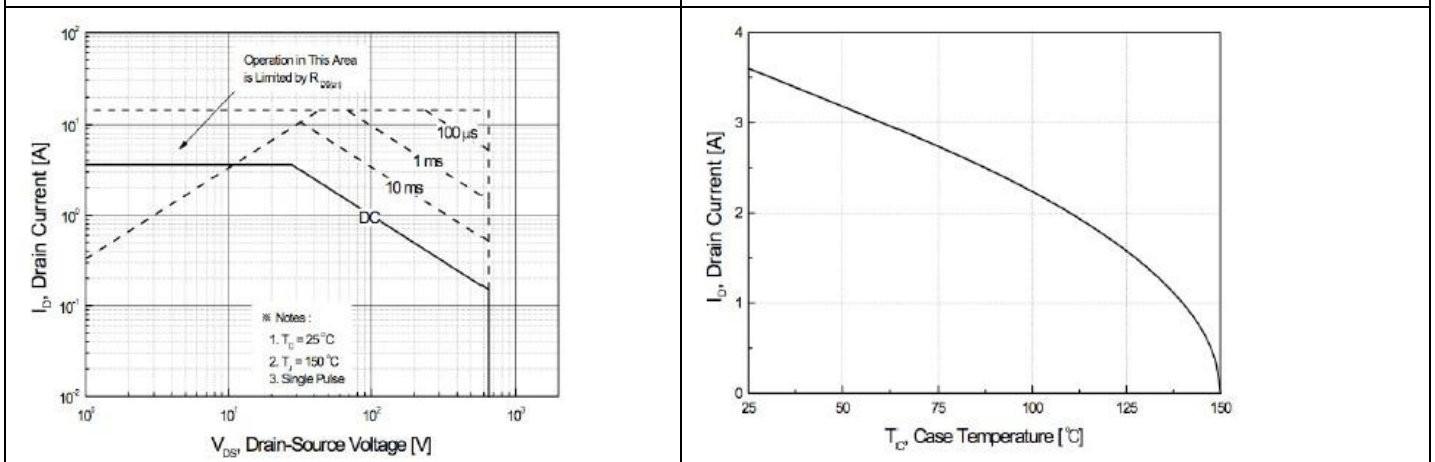


FIG. 9-MAXIMUM SAFE OPERATING AREA

FIG. 10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

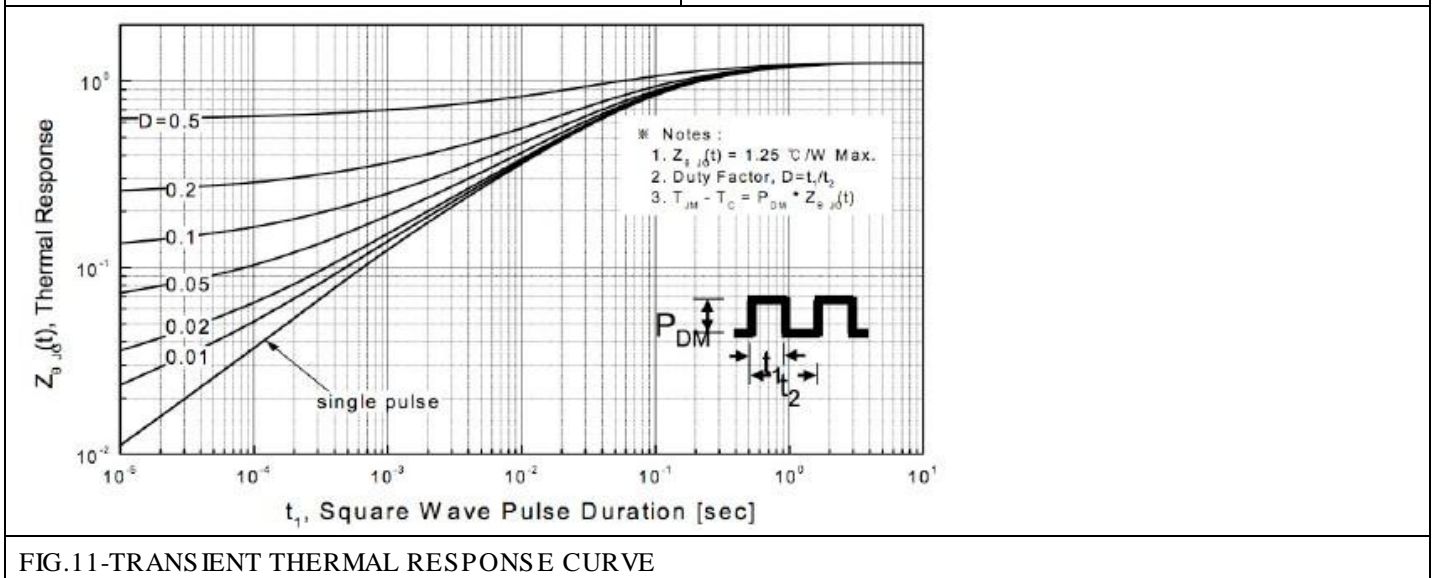


FIG. 11-TRANSIENT THERMAL RESPONSE CURVE

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