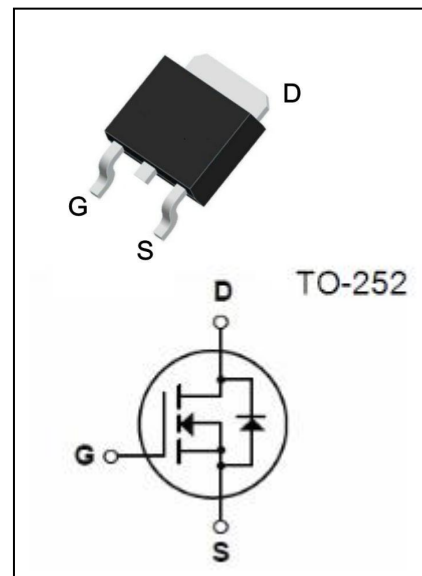|	**SMD4N65**
	650V N-Channnel MOSFET

● Features：

■ 4.0A, 650V, $R_{DS(on)(Typ)}$ =2.2Ω@V_{GS}=10V

■ Low Gate Charge

■ Low C_{rss}

■ 100% Avalanche Tested

■ Fast Switching

■ Improved dv/dt Capability

● Application:

■ High Frequency Switching Mode Power Supply

■ Active Power Factor Correction

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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		650	V
I_D	Drain Current - Continuous(Tc=25°C)		4.0*	A
	- Continuous(Tc=100°C)		2.5*	A
I_{DM}	Drain Current -Pulsed (Note1)		16*	A
V_{GSS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note2)		240	mJ
I_{AR}	Avalanche Current (Note1)		4.0	A
E_{AR}	Repetitive Avalanche Energy (Note1)		10.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note3)		4.5	V/ns
P_D	Power Dissipation(T$_C$ =25°C）		51	W
	-Derate above 25°C		0.39	W/°C
Tj	Operating Junction Temperature		150	°C
Tstg	Storage Temperature Range		-55 to+150	°C

* Drain Current Limited by Maximum Junction Temperature.

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{θJC}$	Thermal Resistance,Junction to Case	2.5	°C /W
$R_{θJA}$	Thermal Resistance,Junction to Ambient	83	°C /W

Electrical Characteristics(Tc=25°C unless otherwise noted)

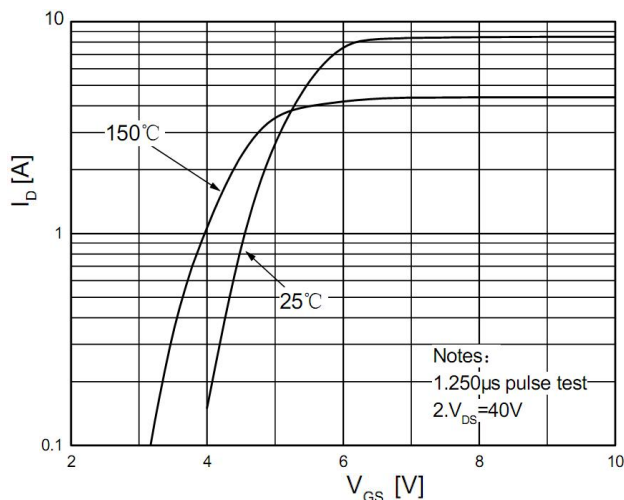| Symbol	Parameter	Test Conditons	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-source Breakdown Voltage	$V_{GS}=0V$,$I_D=250\mu A$	650	--	--	V
$\triangle BV_{DSS}/\triangle T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu A$ (Referenced to 25°C)	--	0.65	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	--	--	1	μA
		$V_{DS}=520V, Tc=125°C$	--	--	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						
$V_{GS(th)}$	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	$V_{GS}=10 V, I_D=2.0A$	--	2.2	2.6	Ω
g_{FS}	Forward Transconductance	$V_{DS}=40 V, I_D=2.0A$ (Note4)	--	3.6	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V$, f=1.0MHz	--	510	--	pF
C_{oss}	Output Capacitance		--	70	--	pF
C_{rss}	Reverse Transfer Capacitance		--	10	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325 V, I_D = 4.0 A$, $R_G = 25 \Omega$ (Note4,5)	--	16	--	ns
t_r	Turn-On Rise Time		--	49	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	45	--	ns
t_f	Turn-Off Fall Time		--	36	--	ns
Q_g	Total Gate Charge	$V_{DS} = 520 V, I_D =4.0 A$, $V_{GS} = 10 V$ (Note4,5)	--	13	--	nC
Q_{gs}	Gate-Source Charge		--	3.8	--	nC
Q_{gd}	Gate-Drain Charge		--	4.9	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	16	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} =0V, I_S=4.0A$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} =0V, I_S=4.0A$, $d I_F /dt=100A/\mu s$ (Note4)	--	330	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.67	--	μC

Notes:

1、Repetitive Rating:Pulse Width Limited by Maximum Junction Temperature.

2、L = 25.0mH, I_{AS} =4.0A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C.

3、I_{SD}≤4.0A, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, Starting T_J = 25°C.

4、Pulse Test : Pulse Width ≤300 μ s, Duty Cycle≤2%.
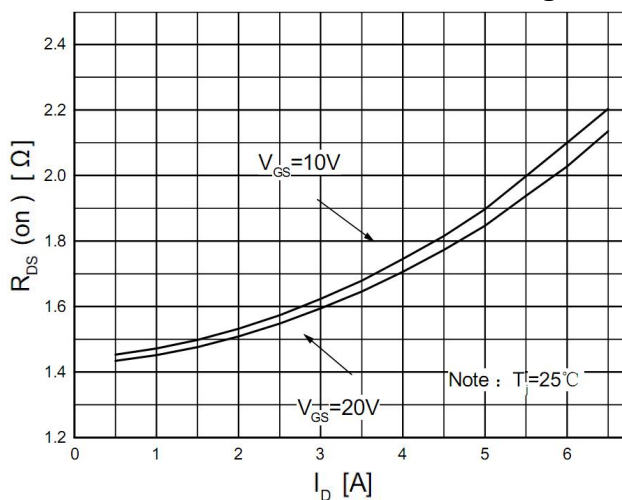
5、Essentially Independent of Operating Temperature.
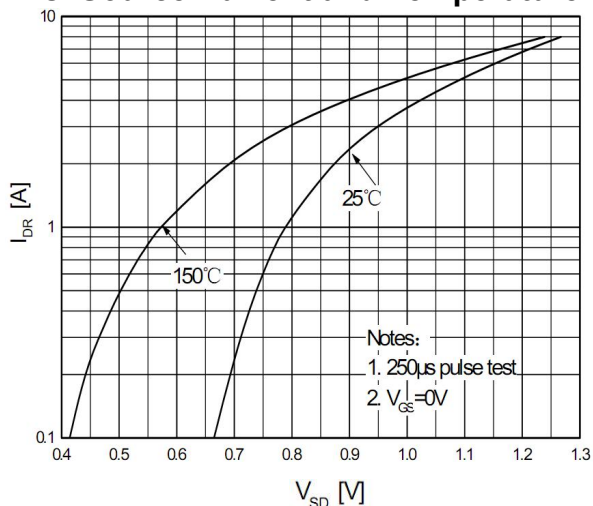
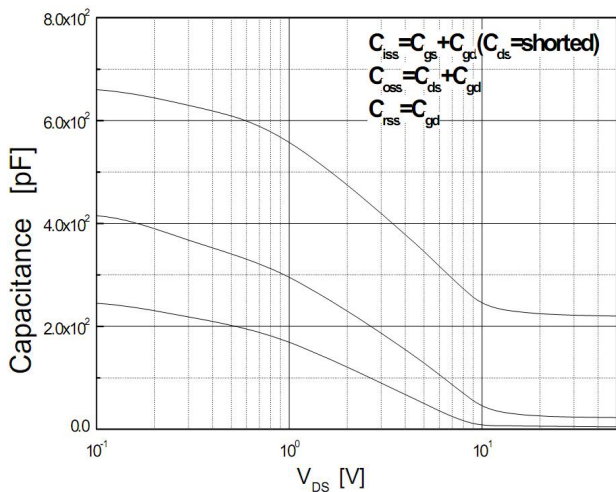## On-Regin Characteristics

Transfer Characteristics

On-Resistance Variation vs. Drain Current and Gate Voltage
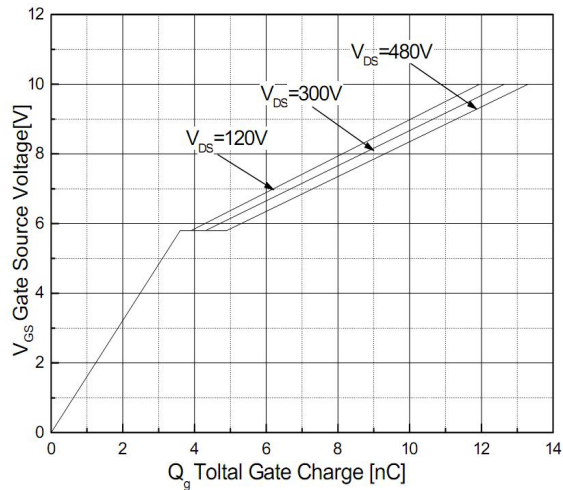

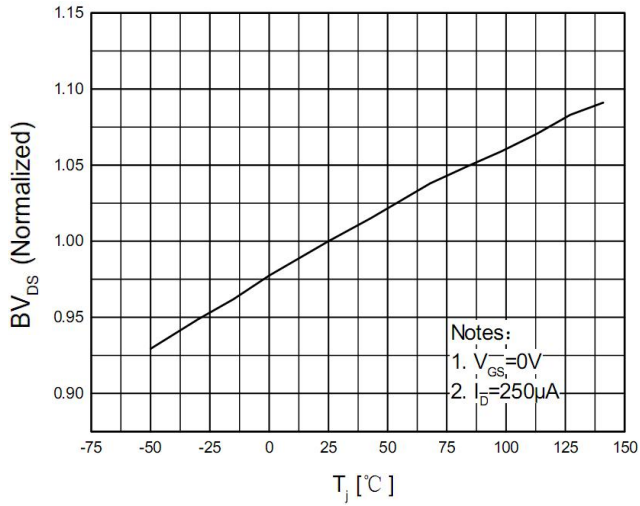## Body Diode Forward Voltage Variation vs. Source Current and Temperature

Capacitance Characteristics
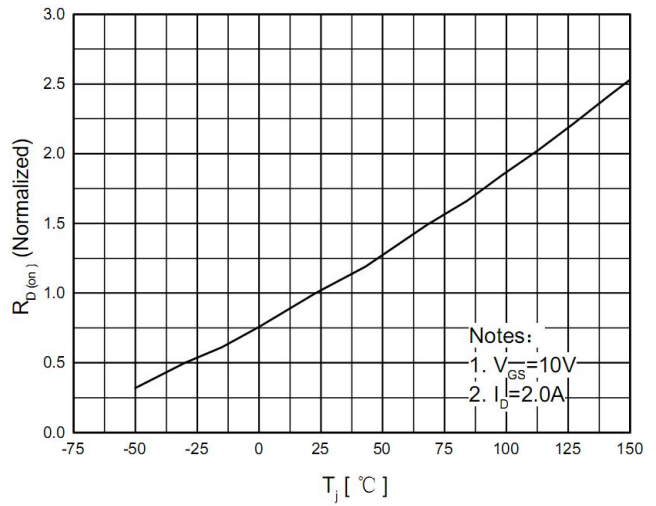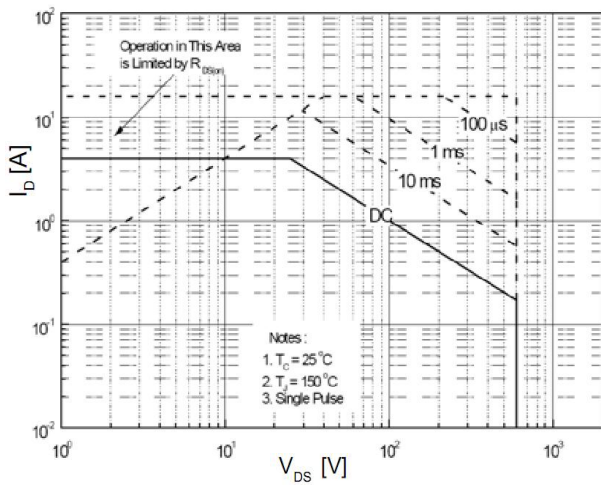

Gate Charge Characteristics
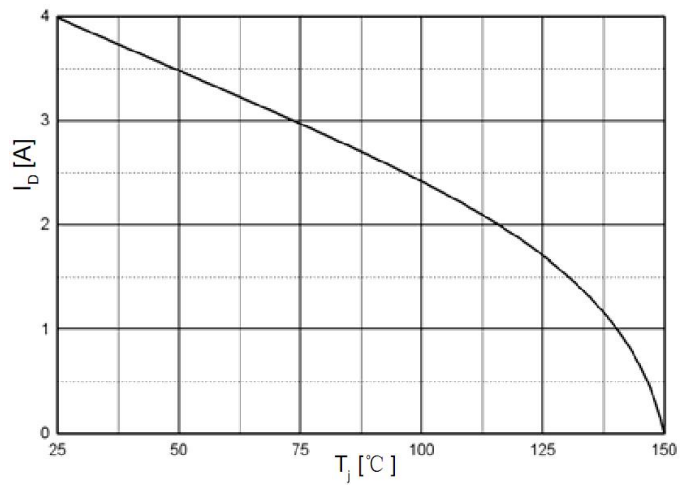
Breakdown Voltage Variation vs. Temperature

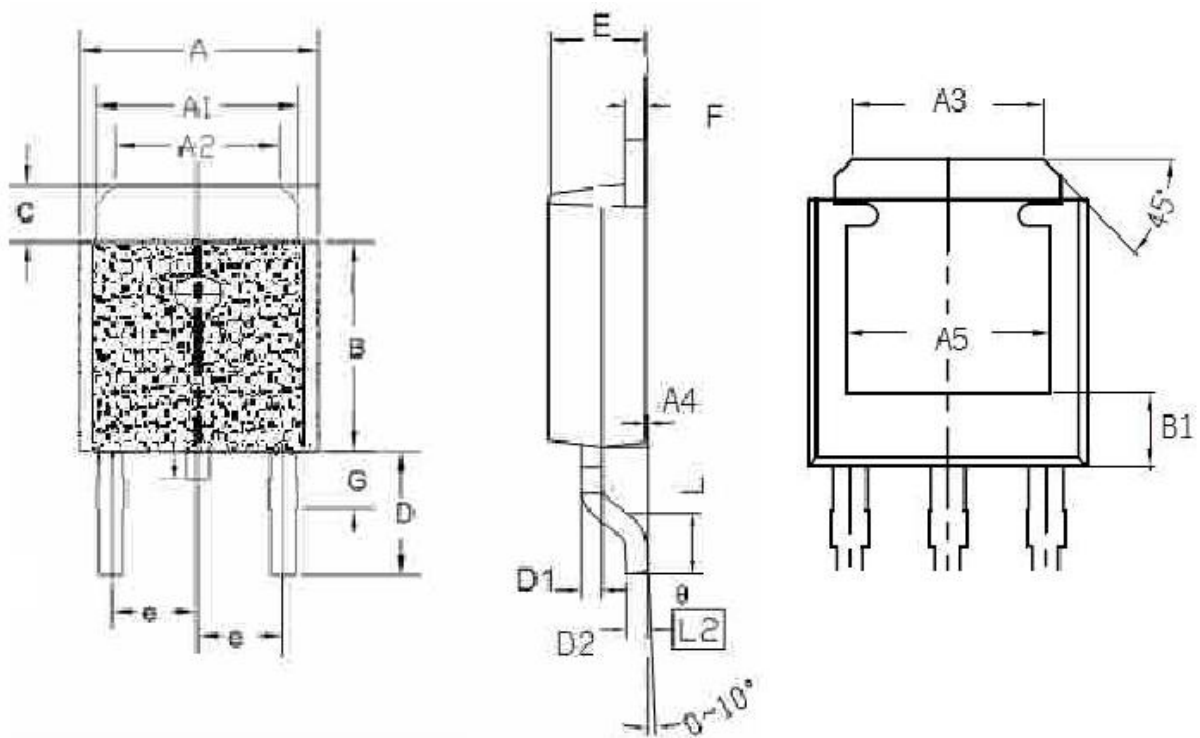## On-Resistance Variation vs. Temperature

Maximum Safe Operating Area

Maximum Drain Current Vs. Case Temperature

TO-252 Package Dimensions

UNIT：mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	6.40		6.60	D	2.90		3.10
A1	5.20		5.40	D1	0.45		0.55
A2	4.40		4.60	D2	0.45		0.55
A3	4.40		4.60	e		2.30	
A4	0		0.15	E	2.20		2.40
A5	4.65		4.95	F	0.45		0.55
B	5.90		6.20	G		1.70	
B1	1.57		1.77	L	1.40		1.60
C	0.90		0.96	θ（度）	0		10.00

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