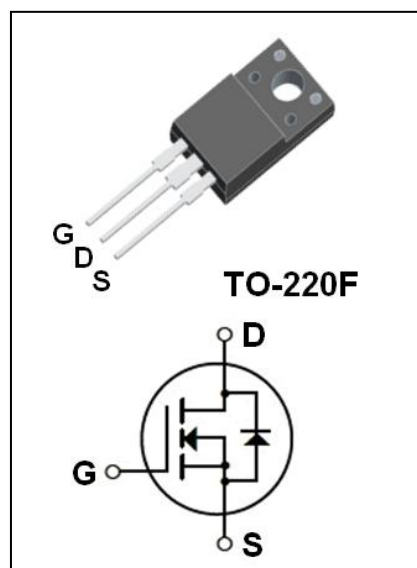# SMF8N65

650V N-Channnel MOSFET

● **Features：**

■ 8.0A, 650V, $R_{DS(on)(Typ)}$ =1.1Ω@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

TO-220F

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)		8.0*	A
	- Continuous(Tc=100°C)		5.1*	A
I_{DM}	Drain Current -Pulsed	(Note1)	32*	A
V_{GSS}	Gate-Source Voltage		±30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note2)	600	mJ
I_{AR}	Avalanche Current	(Note1)	8.0	A
E_{AR}	Repetitive Avalanche Energy	(Note1)	15.0	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		0.41	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	2.44	°C /W
$R_{θJA}$	Thermal Resistance,Junction to Ambient	62.5	°C /W

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

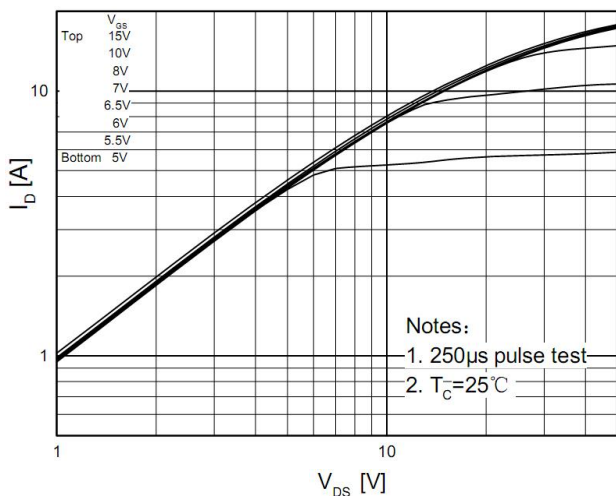| Symbol	Parameter	Test Conditons	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-source Breakdown Voltage	V_{GS}=0V , I_D=250μA	650	--	--	V
$\triangle BV_{DSS}$ /$\triangle T_J$	Breakdown Voltage Temperature Coefficient	I_D=250μA (Referenced to 25°C)	--	0.7	--	V/°C
I_{DSS}	Zero Gate Voltage 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=250μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10 V, I_D=4.0A	--	1.1	1.3	Ω
g_{FS}	Forward Transconductance	V_{DS}=40 V, I_D=4.0A (Note4)	--	7	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=25V,V_{GS}=0V, f=1.0MHz	--	1400	--	pF
C_{oss}	Output Capacitance		--	175	--	pF
C_{rss}	Reverse Transfer Capacitance		--	16	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 325 V, I_D = 8.0 A, R_G = 25 Ω (Note4,5)	--	13.5	--	ns
t_r	Turn-On Rise Time		--	105	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	128	--	ns
t_f	Turn-Off Fall Time		--	49	--	ns
Q_g	Total Gate Charge	V_{DS} = 520 V, I_D =8.0 A, V_{GS} = 10 V (Note4,5)	--	31	--	nC
Q_{gs}	Gate-Source Charge		--	6.5	--	nC
Q_{gd}	Gate-Drain Charge		--	14.7	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	8.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	32	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} =0V,I_S=8.0A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} =0V, I_S=8.0A, d I_F /dt=100A/μs (Note4)	--	325	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.7	--	μC

Notes:

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

2、L = 18.5mH, I_{AS} =8.0A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C.

3、I_{SD}≤8.0A, di/dt≤200A/μs, V_{DD}≤$BV_{DSS,}$ Starting T_J = 25°C.

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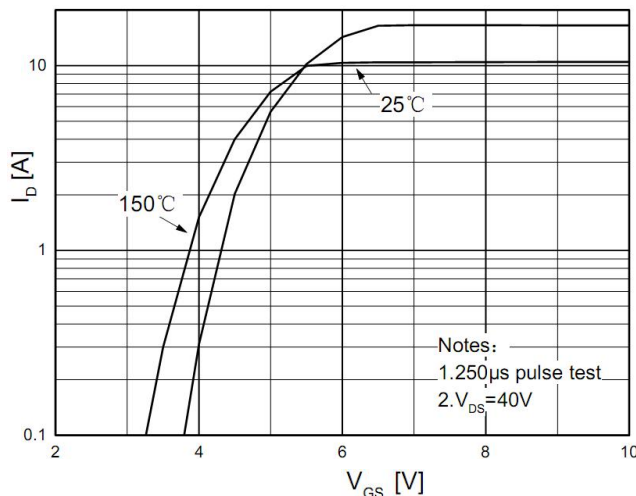
5、Essentially Independent of Operating Temperature.
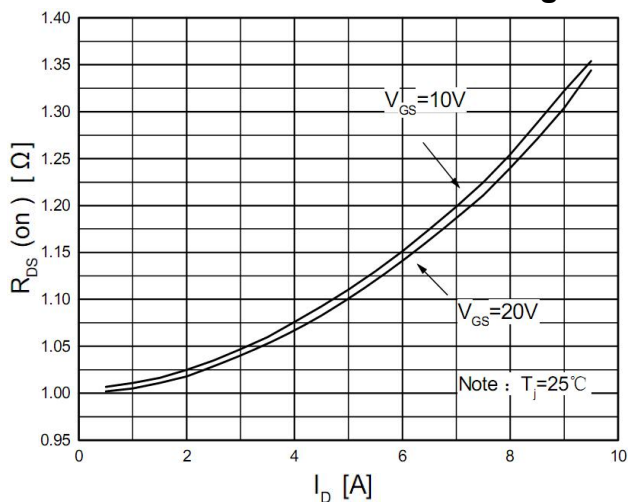
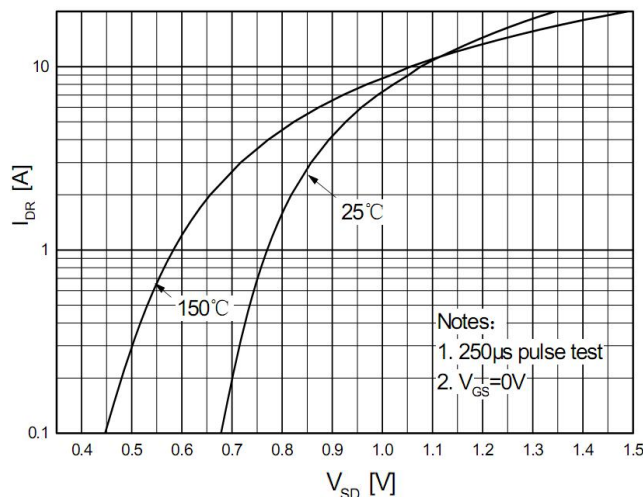## On-Regin Characteristics

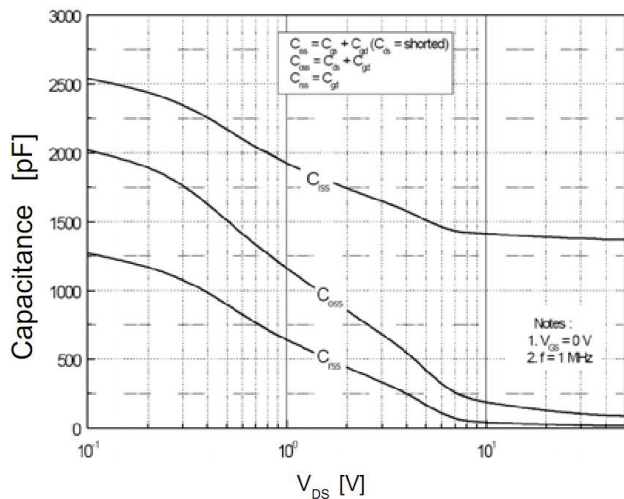## Transfer Characteristics

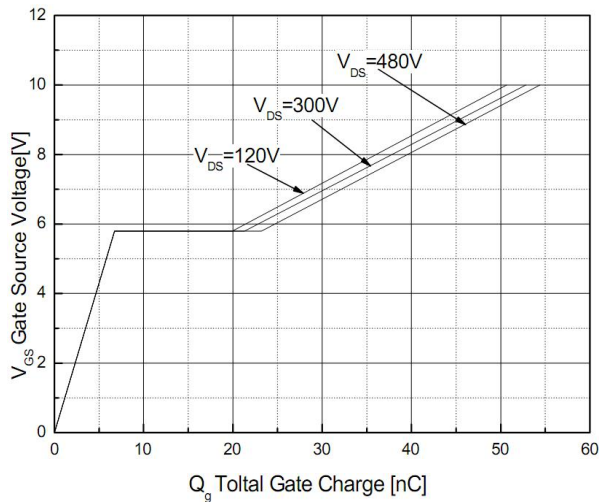## On-Resistance Variation vs. Drain Current and Gate Voltage

Body Diode Forward Voltage Variation vs. Source Current and Temperature
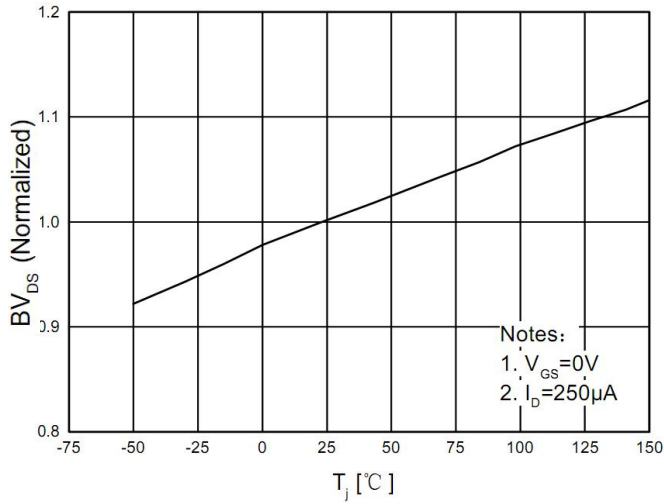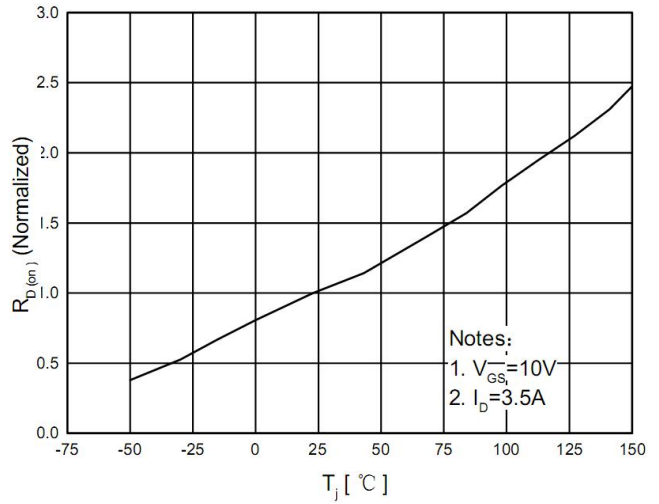

Capacitance Characteristics

Gate Charge Characteristics

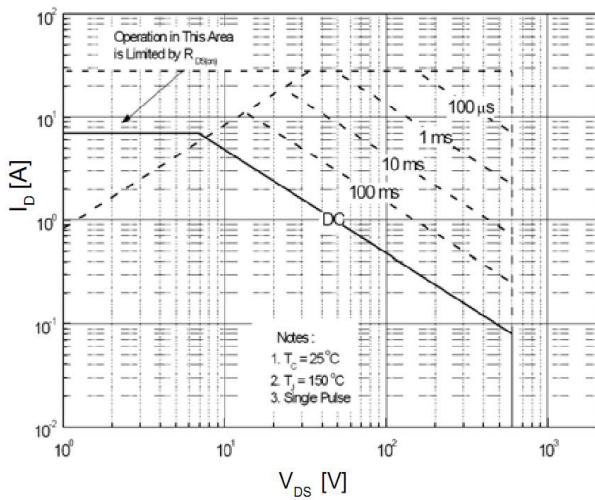## Breakdown Voltage Variation vs. Temperature

Notes:
1. $V_{GS}=0V$
2. $I_D=250\mu A$

On-Resistance Variation vs. Temperature

Notes:
1. $V_{GS}=10V$
2. $I_D=3.5A$

Maximum Safe Operating Area

Operation in This Area is Limited by $R_{DS(on)}$

100 μs
1 ms
10 ms
100 ms
DC

Notes:
1. $T_c=25°C$
2. $T_j=150°C$
3. Single Pulse

Maximum Drain Current Vs. Case Temperature

TO-220F Package Dimensions

UNIT：mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	9.80		10.60	D		2.54	
A1		7.00		D1	1.15		1.55
A2	2.90		3.40	D2	0.60		1.00
A3	9.10		9.90	D3	0.20		0.50
B1	15.40		16.40	E	2.24		2.84
B2	4.35		4.95	E1		0.70	
B3	6.00		7.40	E2		1.0×45°	
C	3.00		3.70	E3	0.35		0.65
C1	15.00		17.00	E4	2.30		3.30
C2	8.80		10.80	α（度）		30°	

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