4N65F

4A N-Channel Power MOSFET

Features

New technology for high voltage device
Low on-resistance and low conduction losses
Small package
Ultra Low Gate Charge cause lower driving requirements
100% Avalanche Tested
ROHS compliant

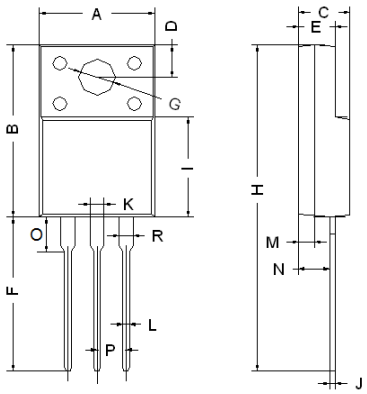
Mechanical Data

Case : TO-220F
Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
Polarity : As marked
Mounting Position : Any

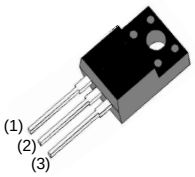
Application

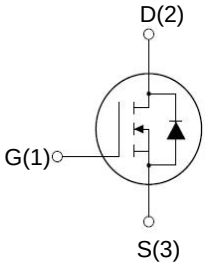
Power factor correction（PFC）
Switched mode power supplies(SMPS)
Uninterruptible Power Supply（UPS）

TO-220F



TO-220F		
Dim	Min	Max
A	9.80	10.30
B	15.20	15.80
C	4.37	4.77
D	2.90	3.30
E	2.50	2.90
F	12.90	13.50
G	3.10	3.30
H	28.40	29.16
I	8.40	9.10
J	0.35	0.58
L	0.68	0.94
M	1.30	1.50
N	2.40	2.60
O	2.60	3.10
P	2.40	2.60
K/R	1.10	1.32
All Dimensions in mm		





Maximum Ratings And Electrical Characteristics

Ratings at 25℃ ambient temperature unless otherwise specified. Single phase half-wave 60Hz,resistive or inductive load, for capacitive load current derate by 20%.

Table 1. Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	4N65F	Unit
Drain-Source Voltage (V_{GS}=0V）	V_{DS}	650	V
Gate-Source Voltage (V_{DS}=0V) ,AC (f>1 Hz)	V_{GS}	±30	V
Continuous Drain Current at Tc=25°C	$I_{D\ (DC)}$	4*	A
Continuous Drain Current at Tc=100°C	$I_{D\ (DC)}$	2.5*	A
Pulsed drain current **(Note 1)**	$I_{DM\ (pluse)}$	16*	A
Maximum Power Dissipation(Tc=25℃) Derate above 25°C	P_D	28.4 0.227	W W/°C
Single pulse avalanche energy **(Note2)**	E_{AS}	27	mJ
Avalanche current **(Note 1)**	I_{AR}	0.7	A
Repetitive Avalanche energy ， t_{AR} limited by T_{jmax} **(Note 1)**	E_{AR}	0.1	mJ

Parameter	Symbol	4N65F	Unit
Drain Source voltage slope, V_{DS} ≤480 V,	dv/dt	50	V/ns
Reverse diode dv/dt， V_{DS} ≤480 V,I_{SD}<I_D	dv/dt	15	V/ns
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55...+150	°C

* limited by maximum junction temperature

Table 2. Thermal Characteristic

Parameter SymbolUnit	Symbol	4N65F	Unit
Thermal Resistance，Junction-to-Case（Maximum）	R_{thJC}	4.4	°C /W
Thermal Resistance，Junction-to-Ambient （Maximum）	R_{thJA}	80	°C /W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	650			V
Zero Gate Voltage Drain Current(Tc=25℃)	I_{DSS}	V_{DS}=650V,V_{GS}=0V			1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I_{DSS}	V_{DS}=650V,V_{GS}=0V			50	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	3		4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A		950	1100	mΩ
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz		304		pF
Output Capacitance	C_{oss}			18		pF
Reverse Transfer Capacitance	C_{rss}			0.6		pF
Total Gate Charge	Q_g	V_{DS}=480V,I_D=4A, V_{GS}=10V		8.8	12	nC
Gate-Source Charge	Q_{gs}			2.3		nC
Gate-Drain Charge	Q_{gd}			4		nC
Switching times						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=380V,I_D=2.5A, R_G=5Ω,V_{GS}=10V		8		nS
Turn-on Rise Time	t_r			4		nS
Turn-Off Delay Time	$t_{d(off)}$			52	70	nS
Turn-Off Fall Time	t_f			9	18	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}	T_C=25°C			4	A
Pulsed Source-drain current(Body Diode)	I_{SDM}				16	A
Forward On Voltage	V_{SD}	Tj=25°C,I_{SD}=4A,V_{GS}=0V		0.9	1.2	V
Reverse Recovery Time	t_{rr}	Tj=25°C,I_F=2A,di/dt=100A/μs		200		nS
Reverse Recovery Charge	Q_{rr}			0.6		uC
Peak reverse recovery current	I_{rrm}			6		A

Notes: 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2. Tj=25℃,VDD=50V,VG=10V, R_G=25Ω

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves) 4N65F

Figure1. Safe operating area

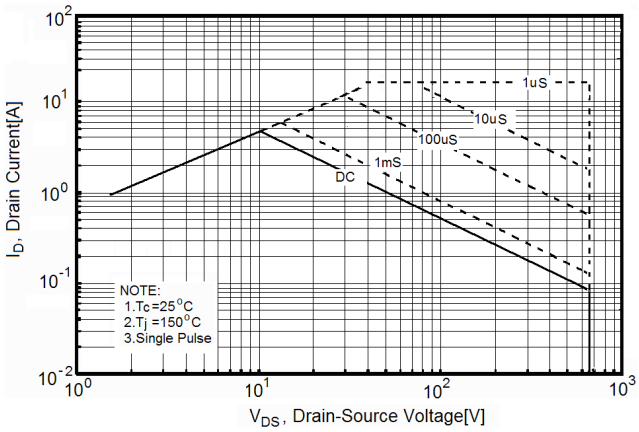


Figure2. Source-Drain Diode Forward Voltage

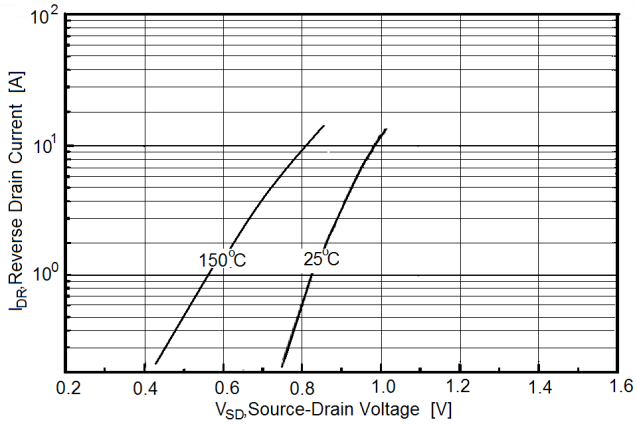


Figure3. Output characteristics

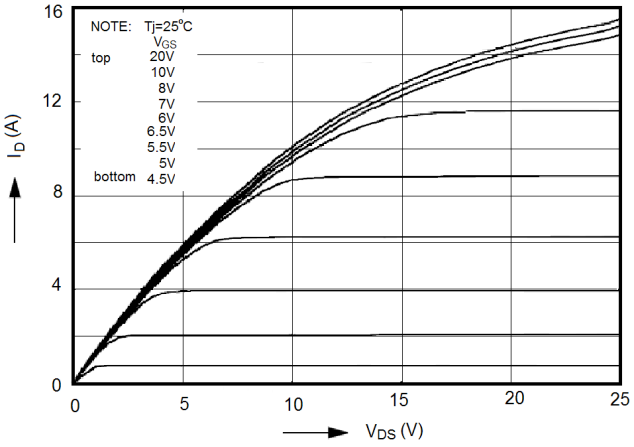


Figure4. Transfer characteristics

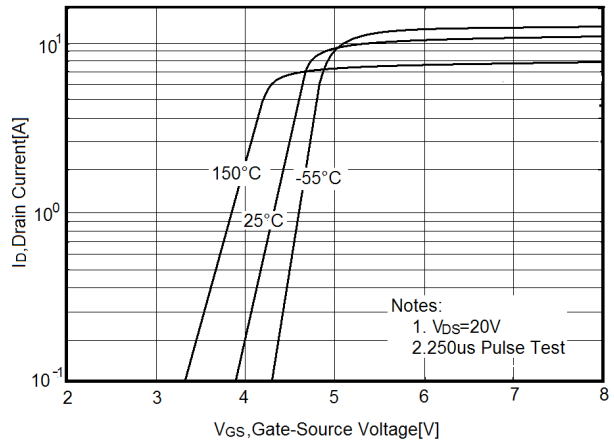


Figure5. Static drain-source on resistance

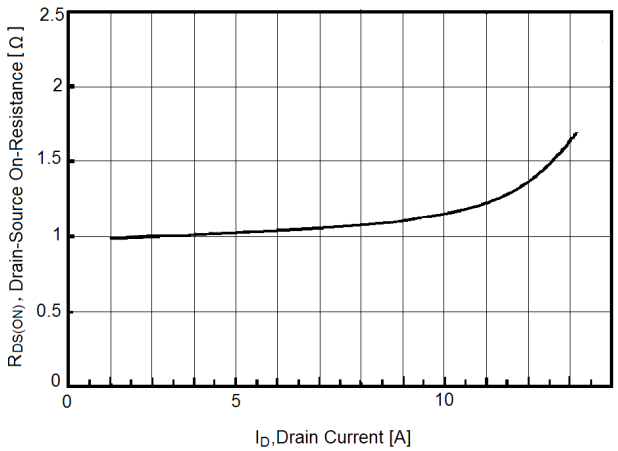


Figure6. $R_{DS(ON)}$ vs Junction Temperature

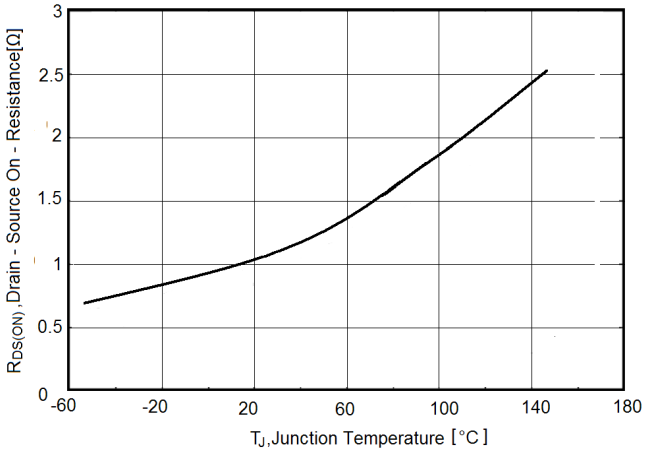


Figure7. BV_{DSS} vs Junction Temperature

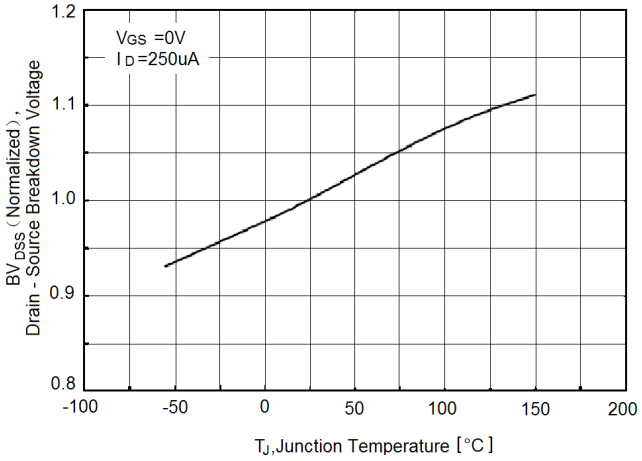


Figure8. Maximum I_D vs Junction Temperature

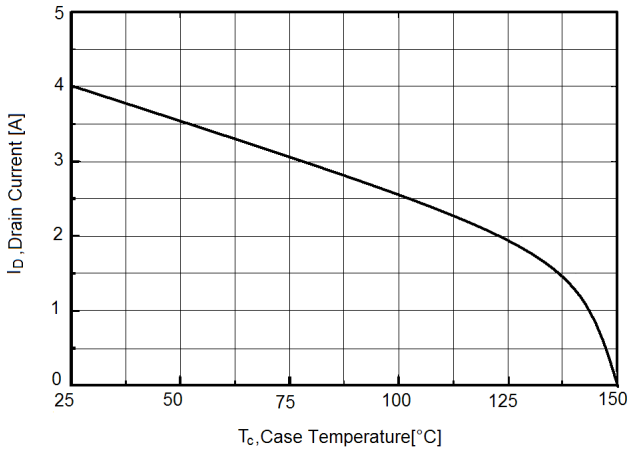


Figure9. Gate charge waveforms

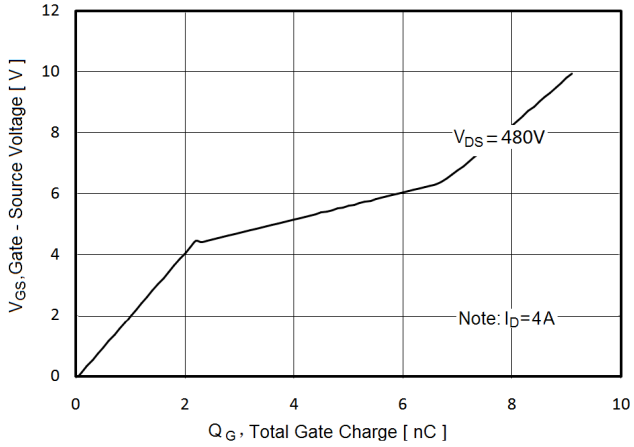


Figure10. Capacitance

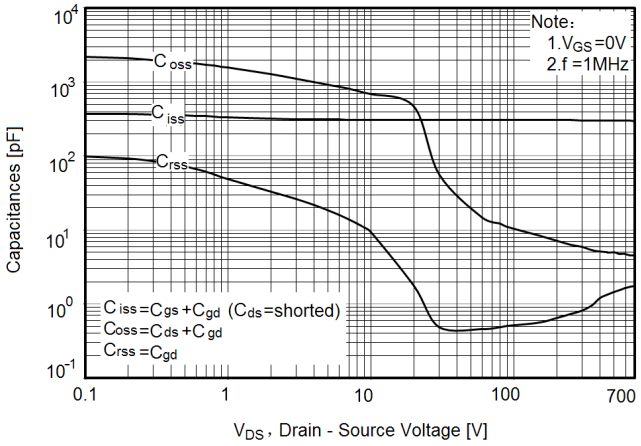


Figure11. Transient Thermal Impedance

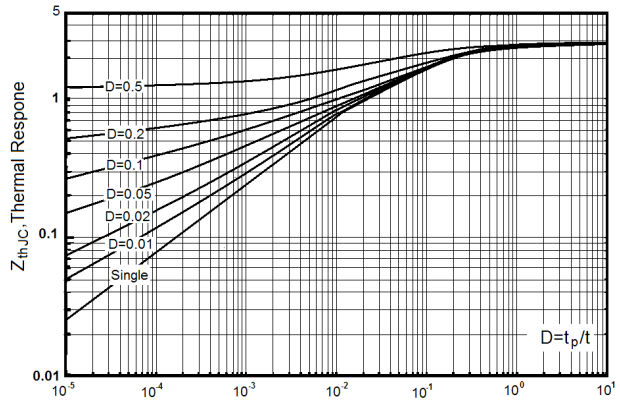


Figure12. Safe operating area