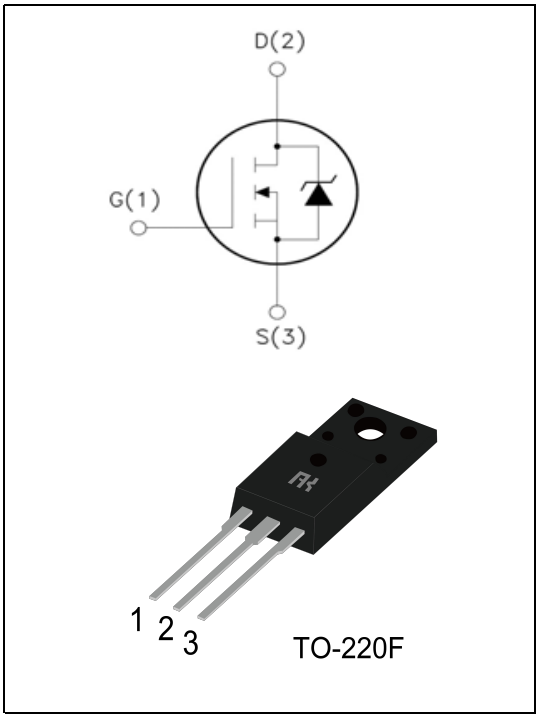
650V,2A N-CHANNEL POWER MOSFET



GENERAL DESCRIPTION

The AKF2N65P 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 .It can be used in a wide variety applications.

Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge :Qg=6.7nC (Typ.)
- BVDSS=650V,I_D=2A
- R_{DS}(on) : 4.5 Ω (Typ) @V_G=10V
- 100% Avalanche Tested

application:

- power supplies
- PWM motor controls
- high efficient DC to DC converters
- bridge circuits

Absolute Maximum Ratings (Ta=25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		650	V
I_D	Drain Current	T_j=25℃	2.0	A
		T_j=100℃	1.25	
V_{GSS}	Gate - Source voltage		±30	V
E_{AS}	Single Pulse Avalanche Energy (note1)		120	mJ
I_{AR}	Avalanche Current (note2)		2	A
P_D	Power Dissipation (Tj=25℃)		28	W
T_j	Junction Temperature(Max)		150	℃
T_{stg}	Storage Temperature		-55~+150	℃
TL	Maximum lead temperature for soldering purpose,1/8" from case for 5 seconds		300	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance,Junction to Case	-	4.46	℃/W
$R_{\theta JA}$	Thermal Resistance,Junction to Ambient	-	62.5	℃/W

Electrical Characteristics (Ta=25℃ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA，V_{GS}=0	650	-	-	V
△BVDSS/△TJ	Breakdown Voltage Temperature Coefficient	I_D=250μA ,Reference to 25℃	-	0.6	-	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	-	-	1	μA
		V_{DS}=520V, Tj=125℃	-	-	10	
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	
On Characteristics						
$V_{GS(TH)}$	Date Threshold Voltage	I_D=250μA,V_{DS}=V_{GS}	2	-	4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	I_D=1A,V_{GS}=10V	-	4.5	4.8	Ω
Dynamic Characteristics						
Ciss	Input Capacitance	V_{DS}=25V，V_{GS}=0，f=1.0MHz	-	320	-	pF
Coss	Output Capacitance		-	40	-	
Crss	Reverse Transfer Capacitance		-	5	-	
Switching Characteristics						
Td(on)	Turn-On Delay Time	V_{DD}=325V，I_D=2A R_G=25Ω (Note 3,4)	-	10	-	ns
Tr	Turn-On Rise Time		-	25	-	
Td(off)	Turn-Off Delay Time		-	20	-	
Tf	Turn-Off Rise Time		-	24	-	
Qg	Total Gate Charge	V_{DS}=520V,V_{GS}=10V，I_D=2A (Note 3,4)	-	6.7	-	nC
Qgs	Gate-Source Charge		-	1.9	-	
Qgd	Gate-Drain Charge		-	1.8	-	
Drain-Source Diode Characteristics and Maximum Ratings						
Is	Max. Diode Forward Current	-	-	-	2	A
I_{SM}	Max. Pulsed Forward Current	-	-	-	8	
V_{SD}	Diode Forward Voltage	I_D=2A	-	-	1.5	V
Trr	Reverse Recovery Time	I_S=2A,V_{GS} =0V diF/dt=100A/μs (Note3)	-	368	-	nS
Qrr	Reverse Recovery Charge		-	1.0	-	μC

Notes : 1, L=55mH, IAS=2A, VDD=50V, RG=25Ω, Starting TJ =25°C
2, Repetitive Rating : Pulse width limited by maximum junction temperature
3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
4, Essentially Independent of Operating Temperature

Typical Characteristics

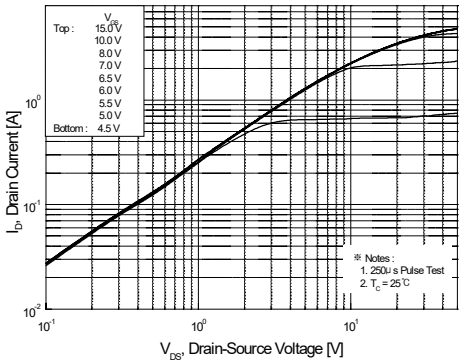


Figure 1. On-Region Characteristics

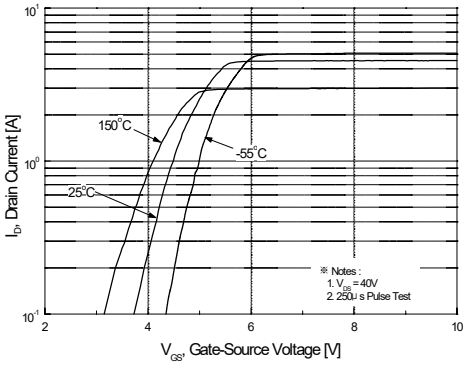


Figure 2. Transfer Characteristics

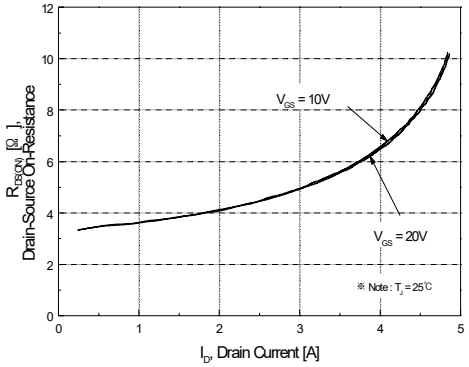


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

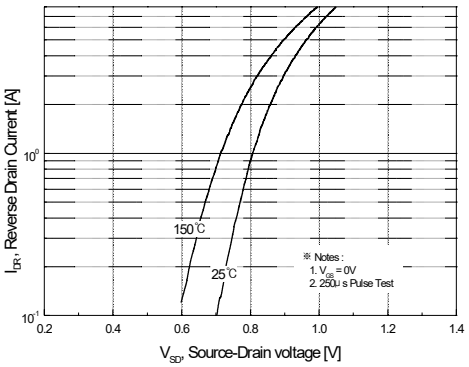


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

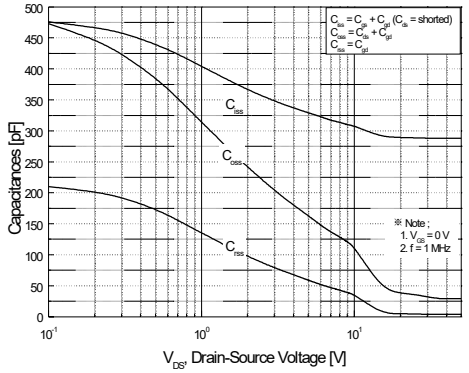


Figure 5. Capacitance Characteristics

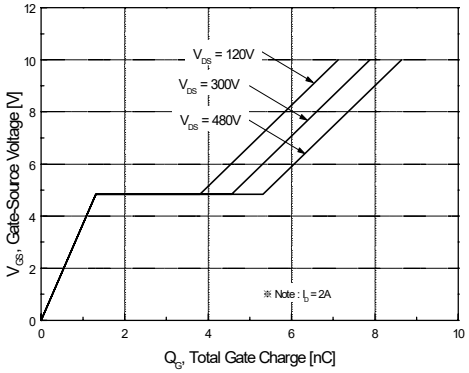


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

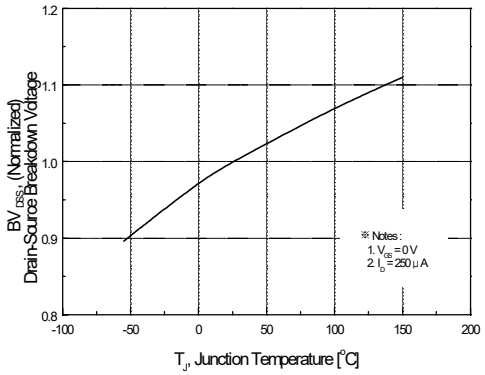


Figure 7. Breakdown Voltage Variation vs Temperature

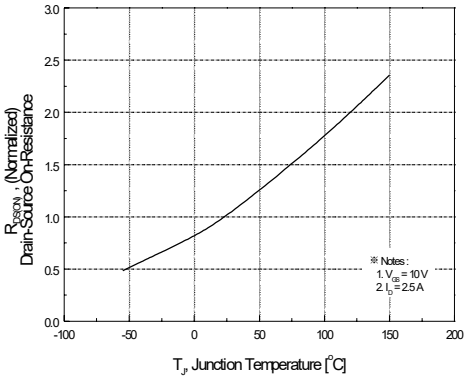


Figure 8. On-Resistance Variation vs Temperature

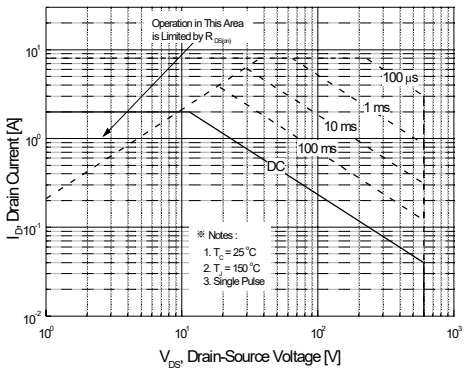


Figure 9-2. Maximum Safe Operating Area

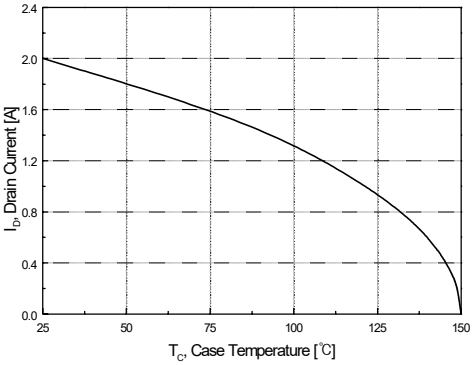
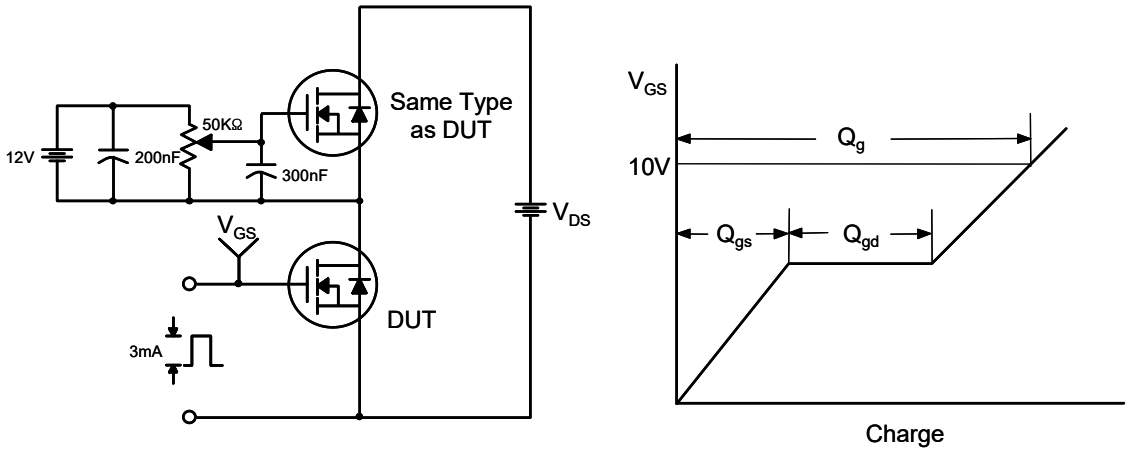
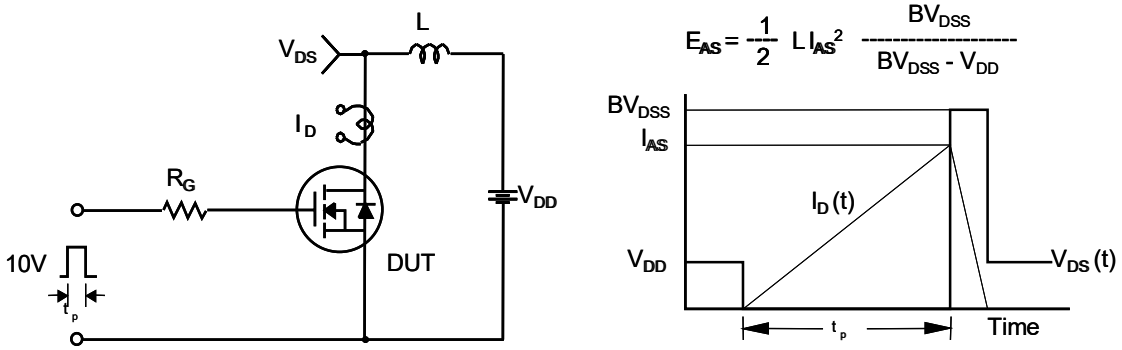


Figure 10. Maximum Drain Current vs Case Temperature

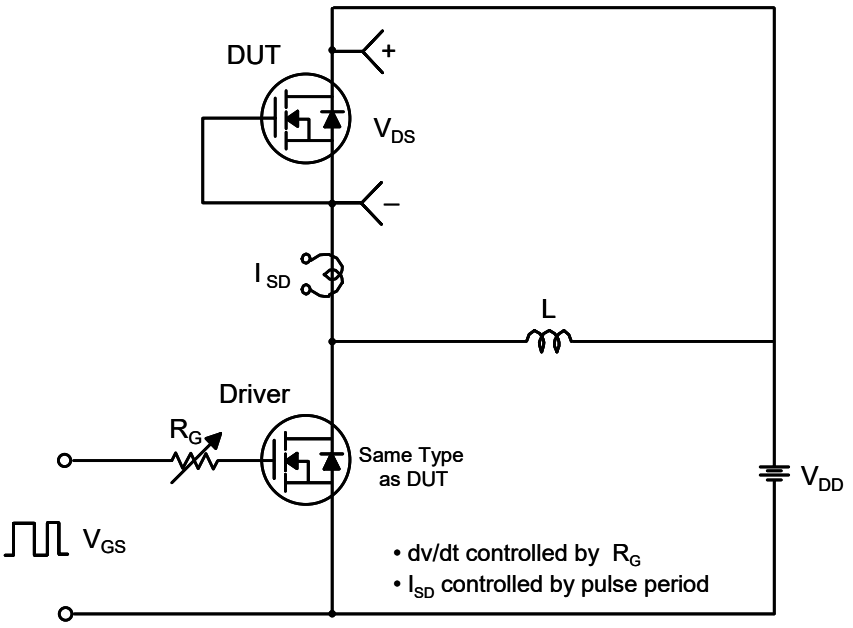
Gate Charge Test Circuit & Waveform

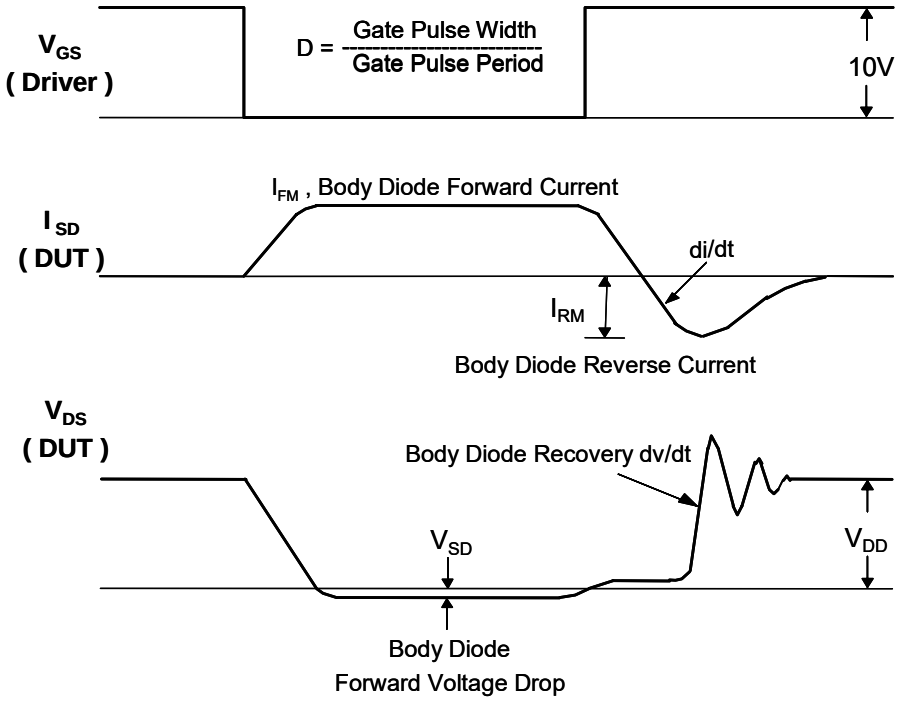


Unclamped Inductive Switching Test Circuit & Waveforms

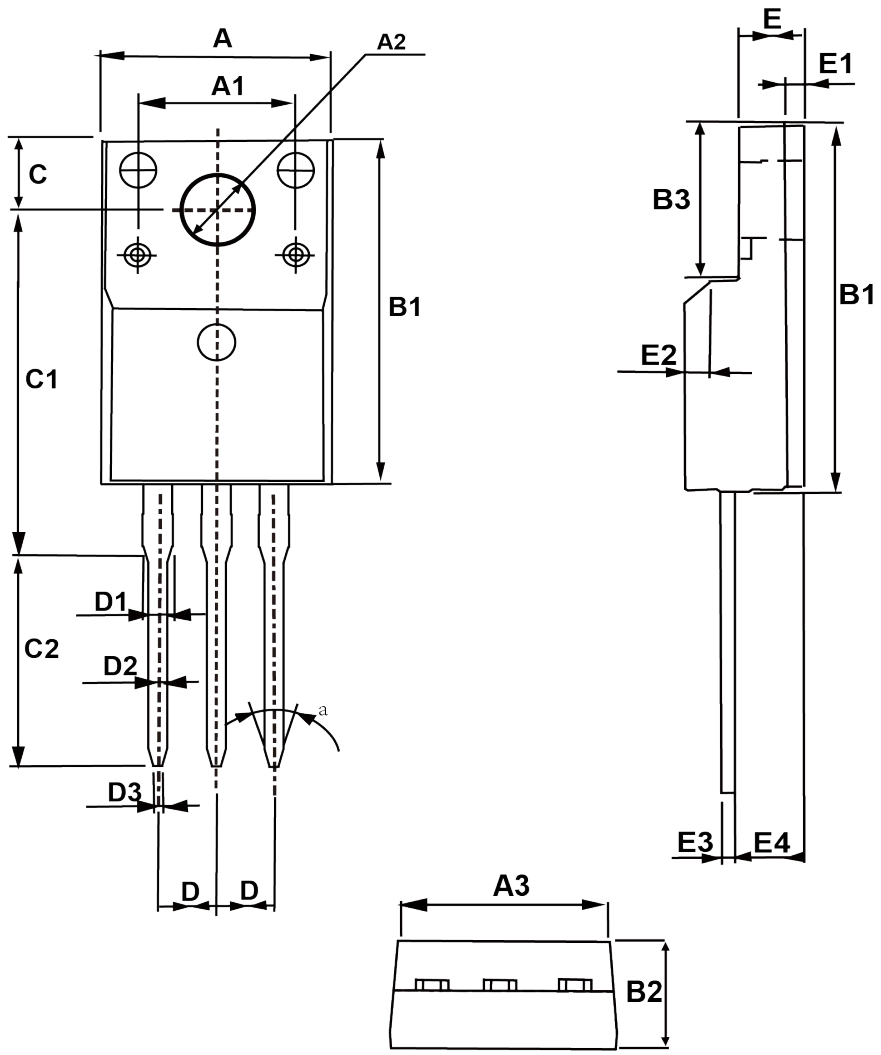


Peak Diode Recovery dv/dt Test Circuit & Waveforms





Package Dimension of TO-220F Unit: mm



Symbol	Min	Max	Symbol	Min	Max
A	9.96	10.36	D	2.54	
A1	7.00		D1	1.15	1.35
A2	3.08	3.28	D2	0.70	0.90
A3	9.25	9.65	D3	0.28	0.48
B1	15.70	16.10	E	2.34	2.74
B2	4.50	4.90	E1	0.70	
B3	6.20	6.80	E2	1.0×45°	
C	3.20	3.40	E3	0.36	0.65
C1	15.20	16.00	E4	2.55	2.95
C2	9.75	10.15	a(angle)	30°	