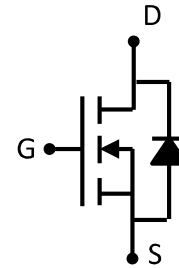


AP4N65F

N-Channel Enhancement Mosfet

Features

- 650V,4A
 $R_{DS(ON)} < 2.5 \Omega @ V_{GS}=10V$ TYP:2.4 Ω
- Fast switching
- Low On-Resistance
- High Input Resistance
- RoHS Compliant



Schematic diagram

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC) PWM applications



TO-220F

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
4N65F	AP4N65F	TO-220F	-	-	1000

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ($T_a=25^\circ\text{C}$)	I_D	4	A
Continuous Drain Current ($T_a=100^\circ\text{C}$)	I_D	2.5	A
Avalanche Current	I_{AS}	4	A
Pulsed Drain Current	I_{DM}	16	A
Single Pulsed Avalanche Energy ($L=25\text{mH}$, $I_{AS}=3.0\text{A}$)	E_{AS}	113	mJ
Peak Diode Recovery dv/dt	dv/dt	5.5	V/ns
Power Dissipation	P_D	50	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.5	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
Breakdown Voltage Temperature	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\mu A, T_J = 25^{\circ}\text{C}$		0.6		V/ $^{\circ}\text{C}$
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^{\circ}\text{C}$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2A$	-	2.4	2.5	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{MHz}$	-	590	650-	pF
Output Capacitance	C_{oss}		-	48	55	
Reverse Transfer Capacitance	C_{rss}		-	5	12	
Switching characteristics^(1, 2)						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 300V, I_D = 4A, R_G = 25\Omega$	-	61	-	ns
Turn-on rise time	t_r		-	23	-	
Turn-off delay time	$t_{d(off)}$		-	33	-	
Turn-off fall time	t_f		-	200	-	
Total Gate Charge	Q_g	$V_{DS} = 480V, I_D = 4A,$ $V_{GS} = 10V$	-	13.3	-	nC
Gate-Source Charge	Q_{gs}		-	3.0	-	
Gate-Drain Charge	Q_{gd}		-	4.8	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	$T_J = 25^{\circ}\text{C}, V_{GS} = 0V, I_S = 4A$	-	-	1.4	V
Diode Forward current	I_S	$T_C = 25^{\circ}\text{C}$	-	-	4	A
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}\text{C}, I_F = 4A, di/dt = 100A/\mu s$		390		ns
Body Diode Reverse Recovery Charge ⁽¹⁾	Q_{rr}	$T_J = 25^{\circ}\text{C}, I_F = 4A, di/dt = 100A/\mu s$		1.5		uc
Gate resistance	R_g				7	Ω

Notes:

1. Repetitive rating: Pulse width limited by maximum junction temperature
2. Starting $T_j = 25^{\circ}\text{C}$, $V_{DD} = 50V$, $L = 25\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 4.0A$
3. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

Typical Performance Characteristics

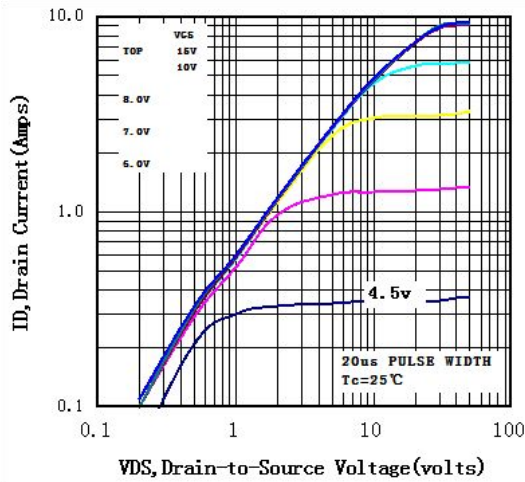


Fig1 Typical Output Characteristics, $T_c=25^\circ\text{C}$

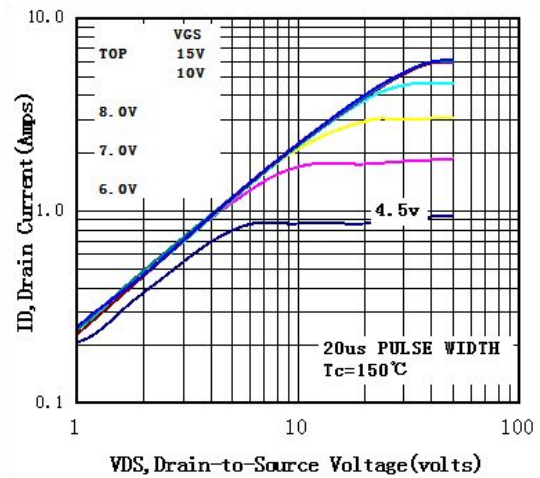


Fig2 Typical Output Characteristics, $T_c=150^\circ\text{C}$

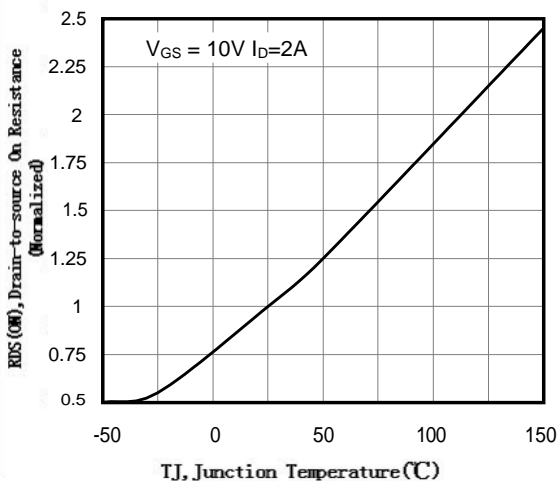


Fig3 Normalized Resistance Vs. Temperature

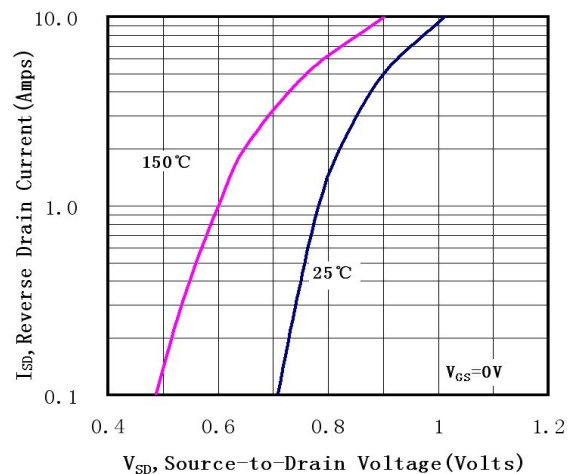


Fig4 Typical Source-Drain Diode Forward Voltage

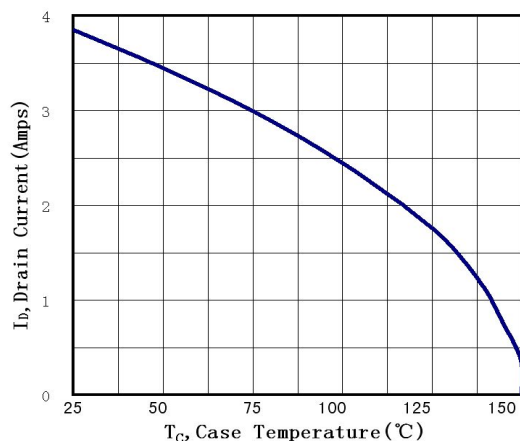


Fig5 Maximum Drain Current Vs. Case Temperature

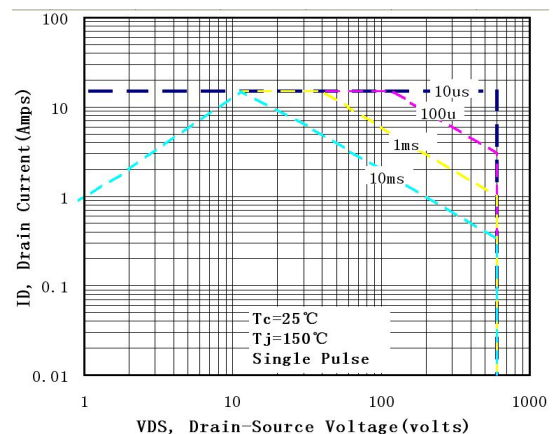


Fig6 Maximum Safe Operating Area

AP4N65F

N-Channel Enhancement Mosfet

TO-220F Package Information

UNIT: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	9.90		10.36	a	1.08		1.48
B	15.40		16.40	a1	0.70		0.90
B1	3.05		3.55	E	2.34		2.75
C	4.40		5.00	C1	2.25		2.85
c	0.40		0.60	C2	2.45		3.05
b	12.40		13.50	R	2.90		3.35
b1	2.90		3.90				

