

12A 650V N-channel Enhancement Mode Power MOSFET
1 Description

These N-channel enhanced vdmofets, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard. TO-220F provides insulation voltage rated at 2000V RMS from all three terminals to external heatsink. TO-220F series comply with UL standards (File ref:E252906).

2 Features

- Fast switching
- ESD improved capability
- Low on resistance($R_{dson} \leq 0.8\Omega$)
- Low gate charge(Typ: 32nC)
- Low reverse transfer capacitances(Typ: 7.0pF)
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

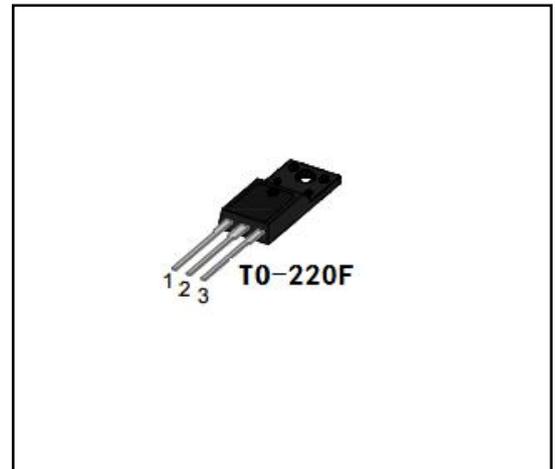
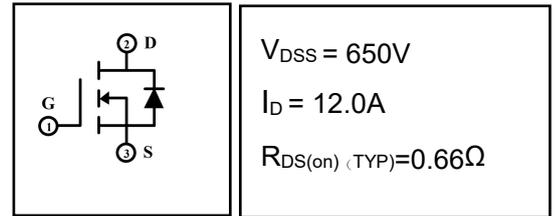
- Used in various power switching circuit for system miniaturization and higher efficiency.
- Power switch circuit of electron ballast and adaptor.

4 Electrical Characteristics
4.1 Absolute Maximum Ratings (Tc=25°C, unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Drian-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Drain Current(continuous) ^(Note 3)	I_D	12	A
Drain Current(continuous)(T=100°C) ^(Note 3)	I_D	7.5	A
Drain Current(Pulsed)	I_{DM}	48	A
Single Pulse Avalanche Energy ^(Note 4)	E_{AS}	550	mJ
Derating Factor above	P_D	0.34	W
Power Dissipation			
Operating Junction Temperature Range	T_j	-55~150	°C
Storage Temperature Range	T_{stg}	-55~150	°C
High Temperature(tin solder)	T_L	300	°C

4.2 Thermal Characteristics

PARAMETER	SYMBOL	VALUE	UNIT
Thermal Resistance, Junction to Case-sink	R_{thJC}	2.8	°C/W
Thermal Resistance, Junction to Ambient	R_{thJA}	62.5	°C/W

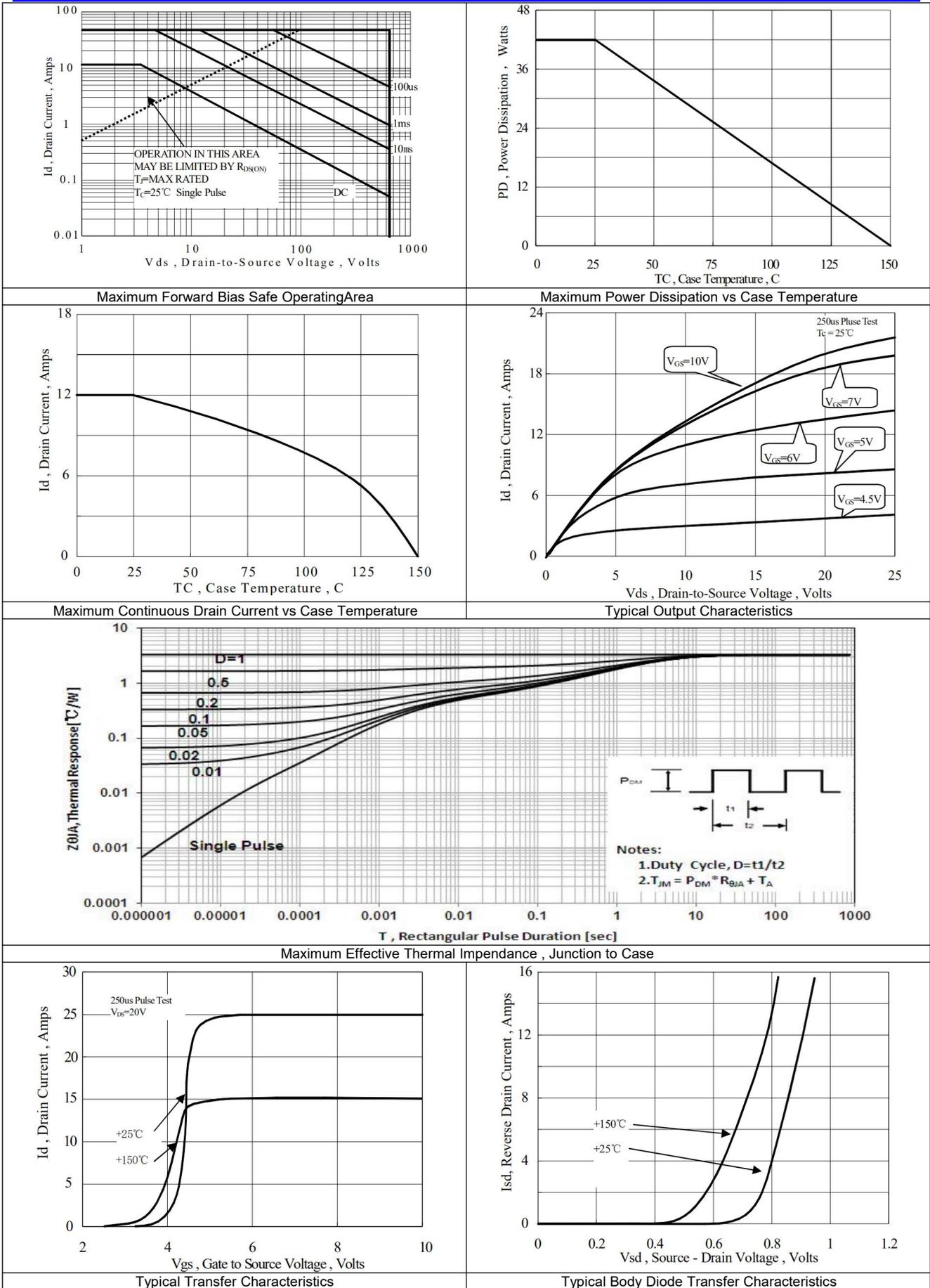


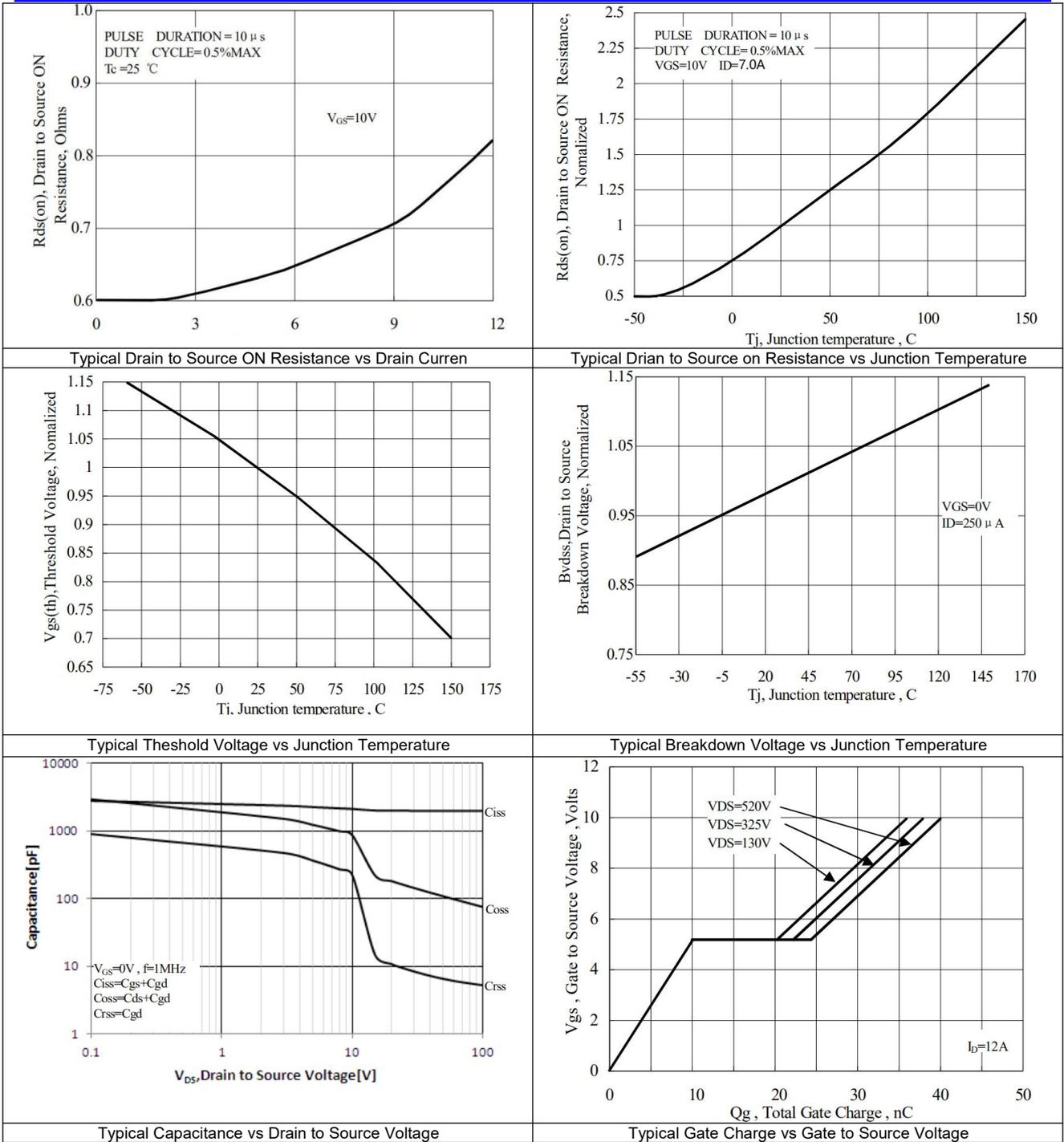
4.3 Electrical Characteristics (Tc=25°C, unless otherwise noted)

PARAMETER	SYMBOL	Test Condition	VALUE			UNIT
			MIN	TYP	MAX	
Off Characteristics						
Drain-source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V, T _C =25°C	--	--	1	μA
		V _{DS} =520V, V _{GS} =0V, T _C =125°C	--	--	100	μA
Gate-to-Body Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V	--	--	±100	nA
On Characteristics (Note 3)						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2.0	--	4.0	V
Drain-source on Resistance	R _{DS(on)}	V _{GS} =10V, I _D =6.0A	--	0.66	0.80	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz	--	1993	--	pF
Output Capacitance	C _{oss}		--	160	--	
Reverse Transfer Capacitance	C _{rss}		--	9.5	--	
Turn-on Delay Time	T _{d(on)}	I _D =12A, V _{DD} =325V, V _{GS} =10V, R _G =10Ω	--	28	--	ns
Turn-on Rise Time	t _r		--	26	--	
Turn-off Delay Time	T _{d(off)}		--	64	--	
Turn-off Fall	t _f		--	45	--	
Total Gate Charge	Q _g	I _D =12A, V _{DD} =520V, V _{GS} =10V	--	40	--	nc
Gate-to-Source Charge	Q _{gs}		--	10	--	
Gate-to-Drain("Miller")C harge	Q _{gd}		--	14	--	
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{FSD}	V _{GS} =0V, I _S =12A	--	--	1.5	V
Continuous Source Current (BodyDiode) (Note 3)	I _S		--	--	12	A
Reverse Recovery Time	t _{rr}	T _J =25°C, I _F =12A, dI _F /dt=100A/μS, V _{GS} =0V	--	655	--	ns
Reverse Recovery Charge	Q _{rr}		--	4310	--	nc

Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: L=10mH, I_D=10.5A, V_{DD}=50V, Start T_J=25°C.



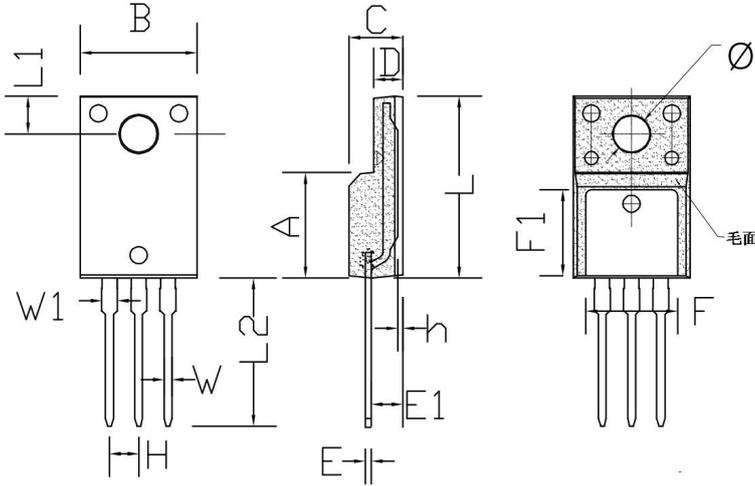


6 Product Specifications and Packaging Models

Product Model	Package Type	Mark Name	RoHS	Package	Quantity
F12N65	TO-220F	F12N65	Pb-free	Tube	1000/box

7 Dimensions

TO-220F PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	10.00	10.50	0.394	0.413
C	4.30	4.90	0.169	0.193
D	2.30	2.70	0.091	0.106
L	15.55	16.15	0.612	0.636
h	0.40	0.60	0.016	0.024
L1	3.15	3.55	0.124	0.140
L2	12.65	13.35	0.498	0.526
W	0.70	0.90	0.028	0.035
W1	1.15	1.55	0.045	0.061
H	2.54 TYP		0.100 TYP	
E	0.48	0.53	0.019	0.021
ϕ	2.90	3.40	0.114	0.134
E1	2.40	2.90	0.094	0.114
F	7.75	8.25	0.305	0.325
F1	7.35	7.85	0.289	0.309