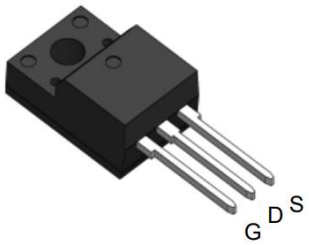
650V N-Channel Enhancement Mode MOSFET

General Features

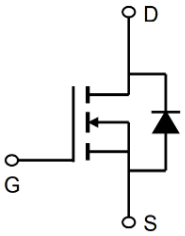
V_{DS}	I_D	$R_{DS(ON)}$ Type @ V_{GS}=10V
650V	10A	0.82 Ω

TO-220F



Description

The VSMP10N65F is silicon N -channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.



Application

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
VSMP10N65F	TO-220F-3L	VSM P10N65F XXXX YYYY	1000

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

Symbol	Parameter	Value	Unit
VDSS	Drain-Source Voltage (V_{GS} = 0V)	650	V
ID	Continuous Drain Current	10	A
IDM	Pulsed Drain Current (note1)	58	A
VGS	Gate-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy (note2)	426	mJ
IAR	Avalanche Current (note1)	9	A
E_{AR}	Repetitive Avalanche Energy note1)	41	mJ
P_D	Power Dissipation (T_C = 25ºC)	32.1	W
TJ, Tstg	Operating Junction and Storage Temperature Range	-55~+150	ºC
RthJC	Thermal Resistance, Junction-to-Case	4.46	ºC/W
RthJA	Thermal Resistance, Junction-to-Ambient	46.7	ºC/W

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Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	650	685	--	V
IDSS	Zero Gate Voltage Drain Current	V_{DS}= 650V, V_{GS}= 0V, T_J=25ºC	--	--	1	μA
IGSS	Gate-Source Leakage	V_{GS} = ±30V	--	--	±100	nA
VGS(th)	Gate-Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.0	--	4.0	V
RDS(on)	Drain-Source On-Resistance (Note3)	V_{GS} = 10V, I_D = 3.5A	--	0.82	0.95	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	1037	--	pF
C_{oss}	Output Capacitance		--	138	--	
C_{rss}	Reverse Transfer Capacitance		--	5.3	--	
Q_g	Total Gate Charge	V_{DD}=520V, I_D = 9A, V_{GS} = 10V	--	19	--	nC
Q_{gs}	Gate-Source Charge		--	7.3	--	
Q_{gd}	Gate-Drain Charge		--	8.5	--	
td(on)	Turn-on Delay Time	V_{DD}=325V, I_D = 7A, R_G = 25Ω	--	18	--	ns
t_r	Turn-on Rise Time		--	30	--	
td(off)	Turn-off Delay Time		--	61	--	
t_f	Turn-off Fall Time		--	36	--	
IS	Continuous Body Diode Current	T_C = 25 ºC	--	--	9.0	A
ISM	Pulsed Diode Forward Current		--	--	36	A
V_{SD}	Body Diode Voltage	T_J = 25ºC, I_{SD} = 7A, V_{GS} = 0V	--	--	1.2	V
trr	Reverse Recovery Time	V_{GS} = 0V,I_S = 7A, di_F/dt =100A /μs	--	431	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.6	--	μC

Note :

1、The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

2、The EAS data shows Max. rating . IAS = 9.0A, VDD = 50V, RG = 25 Ω, Starting TJ = 25 ºC

3、The test condition is Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

4、The power dissipation is limited by 150℃ junction temperature

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

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Typical Characteristics

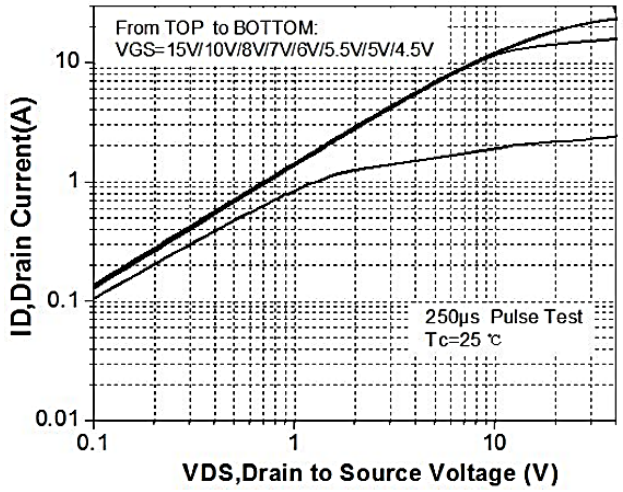

Figure 1. On-Region Characteristics

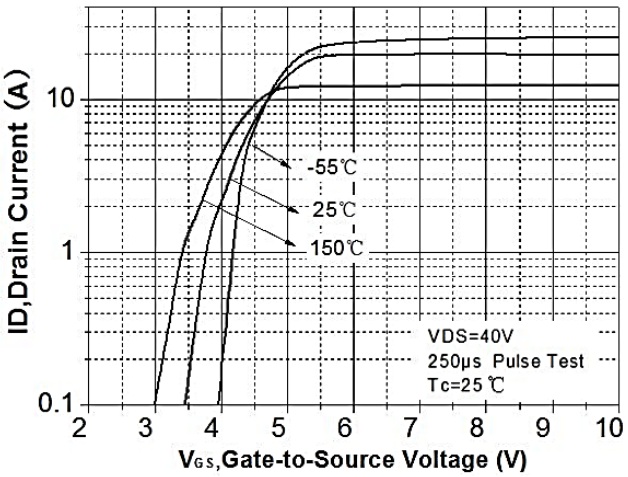

Figure 2. Transfer Characteristics

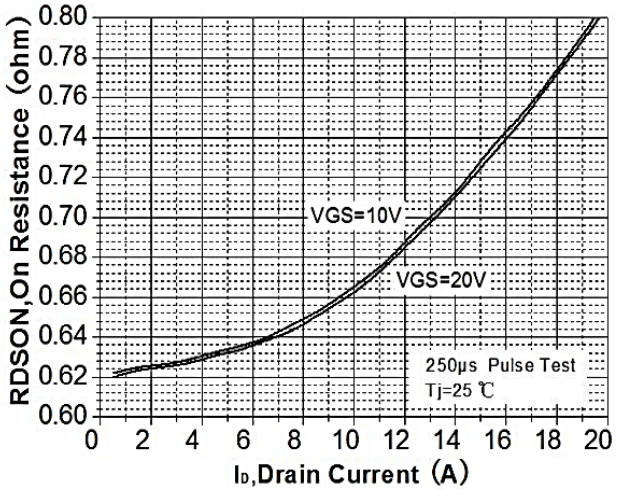

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

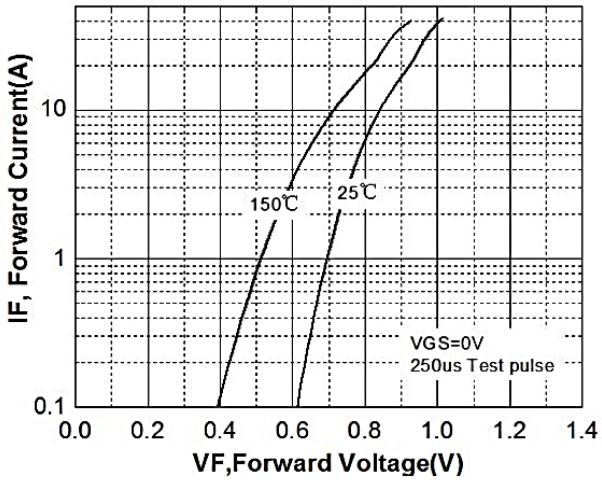

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

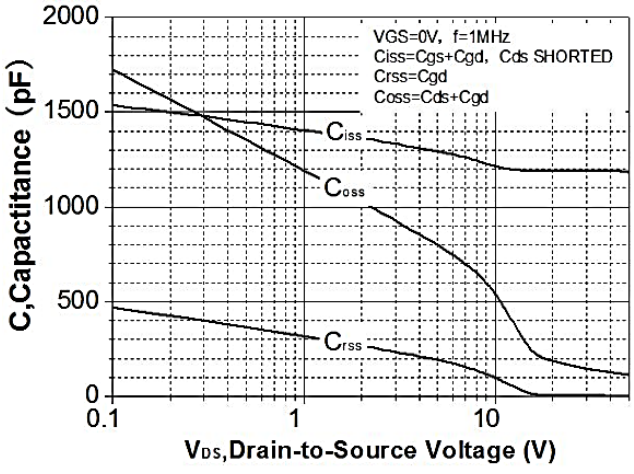

Figure 5. Capacitance Characteristics

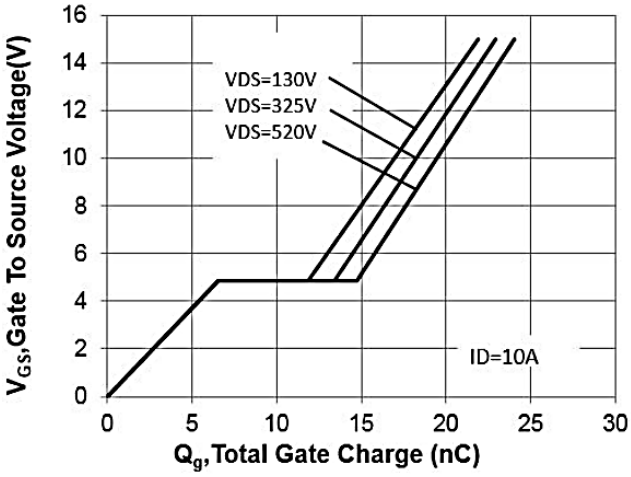

Figure 6. Gate Charge Characteristics

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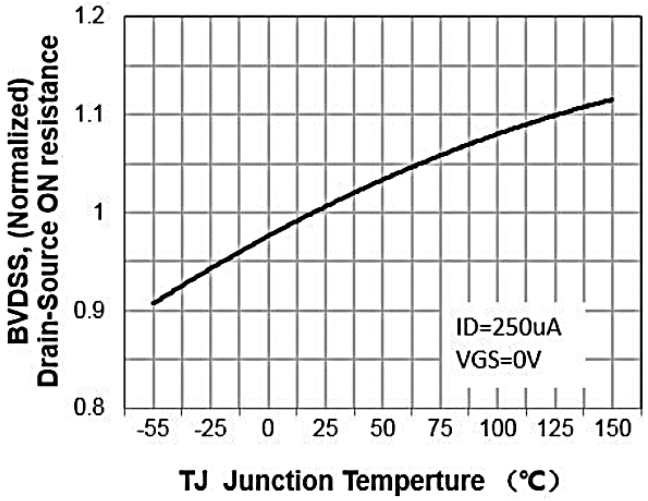


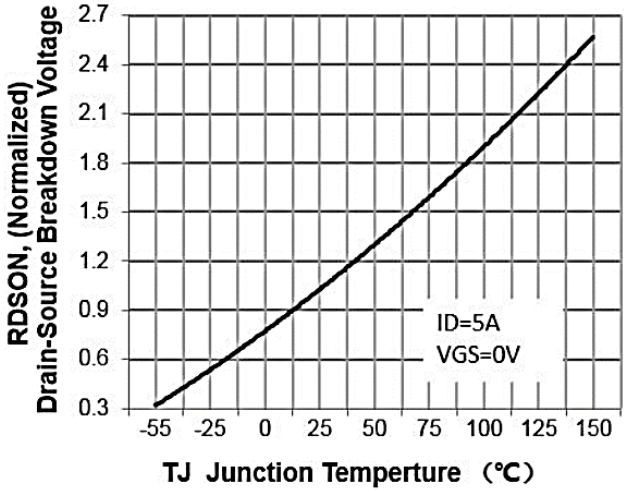
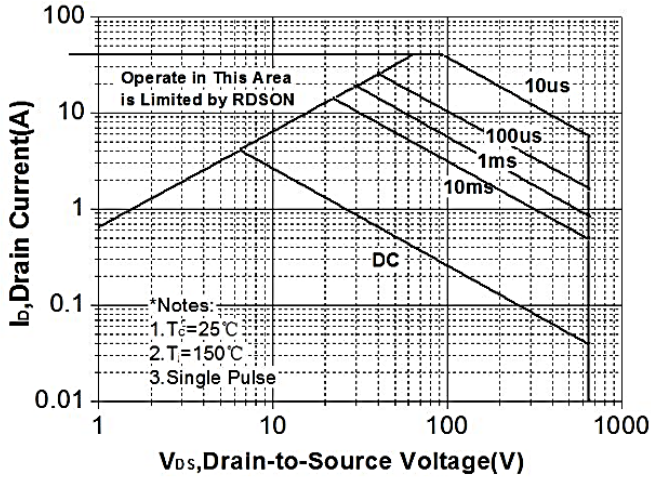


Figure 7. Breakdown Voltage Variation vs Temperature

Figure 8. On-Resistance Variation vs Temperature



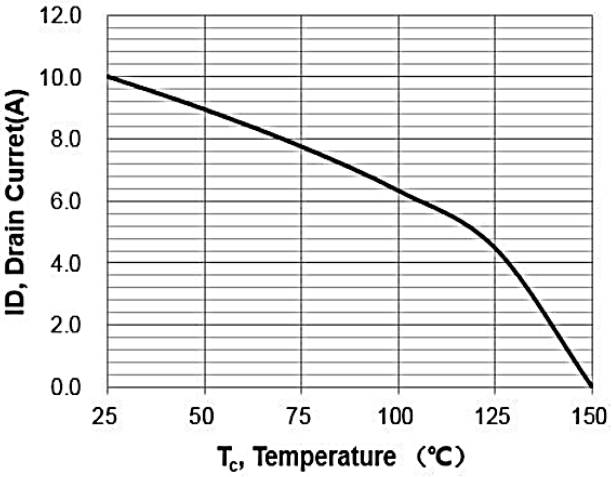


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs Case Temperature

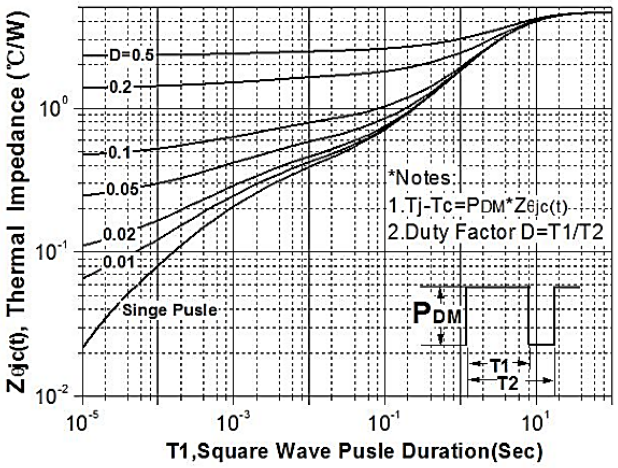


Figure 11. Transient Thermal Response Curve

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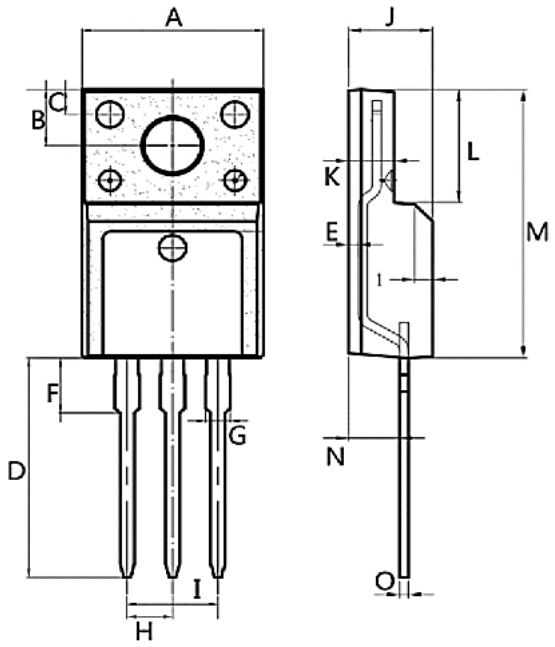
Package Mechanical Data-TO-220F-3L



Symbol	Common	
	mm	
	Mim	Max
A	9.9	10.3
B	2.9	3.5
C	1.15	1.45
D	12.75	13.25
E	0.55	0.75
F	3.1	3.5
G	1.25	1.45
H	2.54	
I	5.08	
J	4.55	4.75
K	2.4	2.7
L	6.35	6.75
M	15.0	16.0
N	2.75	3.15
O	0.45	0.60