

General Description

The WSR4N65F is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSR4N65F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

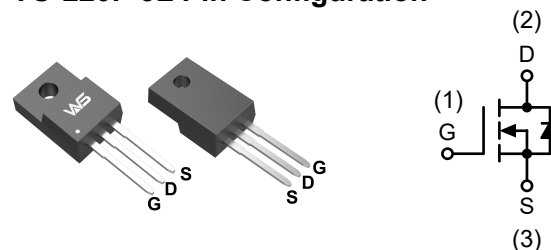
Product Summary

BV_{DSS}	$R_{DS(on)}$	I_D
650V	2600mΩ	4A

Applications

- AC/DC Power Conversion in Switched Mode Power Supplies (SMPS).
- Uninterruptible Power Supply(UPS)
- Adapter.

TO-220F-3L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1.5}$	4	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1.5}$	2.5	A
I_{DM}	Pulsed Drain Current ^{1,2,5}	16	A
EAS	Single Pulse Avalanche Energy ¹	128	mJ
P_D	Total Power Dissipation ^{1,5}	39	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	65	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	3.2	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=250\mu A$	---	0.6	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=3.5A$	---	2600	3000	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0	3.0	4.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.57	---	mV/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=520V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	10	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=40V, I_D=3.5A$	---	5	---	S
Q_g	Total Gate Charge (10V)	$V_{DS}=520V, V_{GS}=10V, I_D=7A$	---	10.2	---	nC
Q_{gs}	Gate-Source Charge		---	2.3	---	
Q_{gd}	Gate-Drain Charge		---	2.1	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=300V, V_{GS}=10V, R_G=25\Omega, I_D=10A.$	---	13	---	ns
T_r	Rise Time		---	15.5	---	
$T_{d(off)}$	Turn-Off Delay Time		---	16	---	
T_f	Fall Time		---	40	---	
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	550	---	pF
C_{oss}	Output Capacitance		---	46	---	
C_{rss}	Reverse Transfer Capacitance		---	2.3	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,2,5}	$V_G=V_D=0V$, Force Current	---	---	4	A
I_{SM}	Pulsed Source Current ^{1,2}		---	---	16	A
V_{SD}	Diode Forward Voltage ¹	$V_{GS}=0V, I_S=7A, T_J=25^\circ\text{C}$	---	---	1.4	V
t_{rr}	Reverse Recovery Time	$I_F=7A, dI/dt=40A/\mu s, T_J=25^\circ\text{C}$	---	454	---	nS
Q_{rr}	Reverse Recovery Charge		---	2076	---	nC

Notes:

Note 1 : limited by maximum junction temperature.

Note 2 : Bond wire current limit.

Note 3 : $V_{DS}=520V, I_D=4A$.

Note 4 : $I_D=0.5A, V_{DD}=50V, T_J=25^\circ\text{C}$.

Note 5 : Repetitive Rating : Pulse width limited by maximum junction temperature.

Typical Characteristics

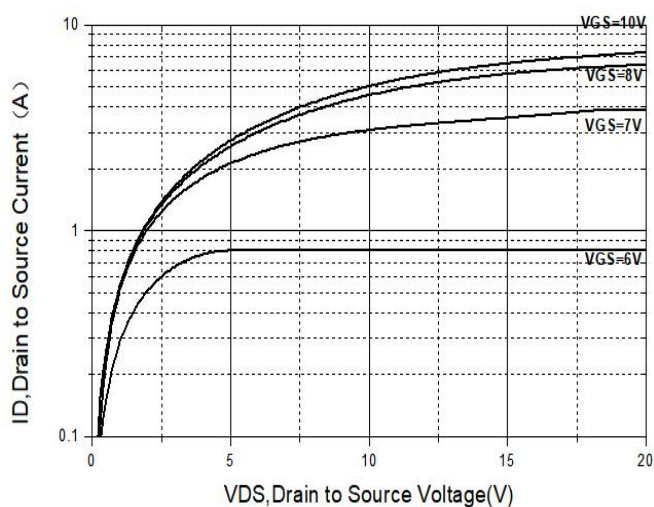


Figure 1 Output Characteristics

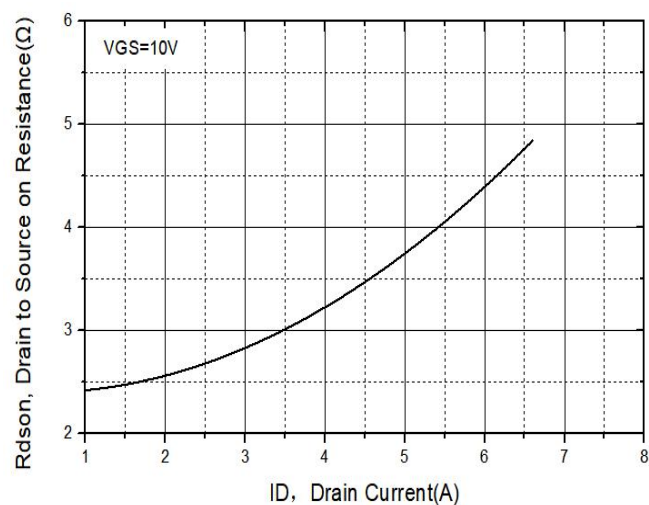


Figure 3 $R_{DS(on)}$ - I_D Characteristics

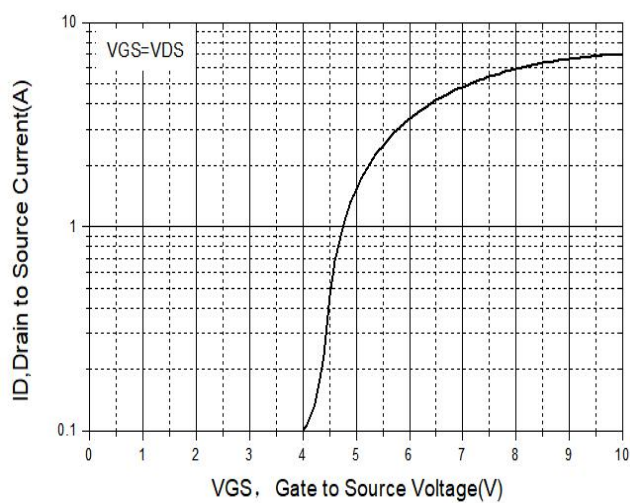


Figure 2 Transfer Characteristics

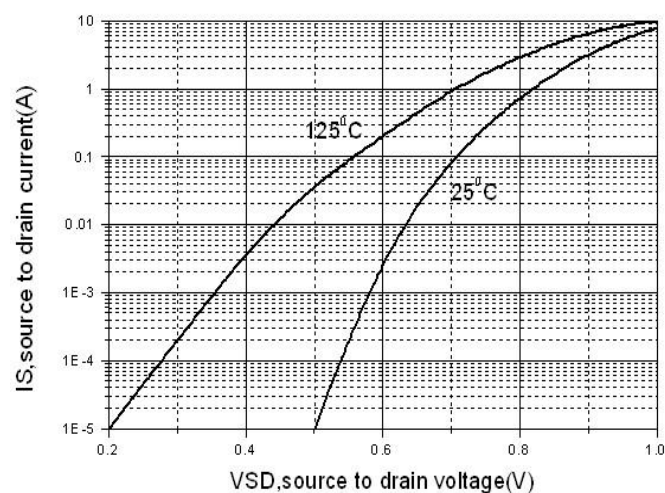


Figure 4 Body diode Characteristics

Typical Characteristics

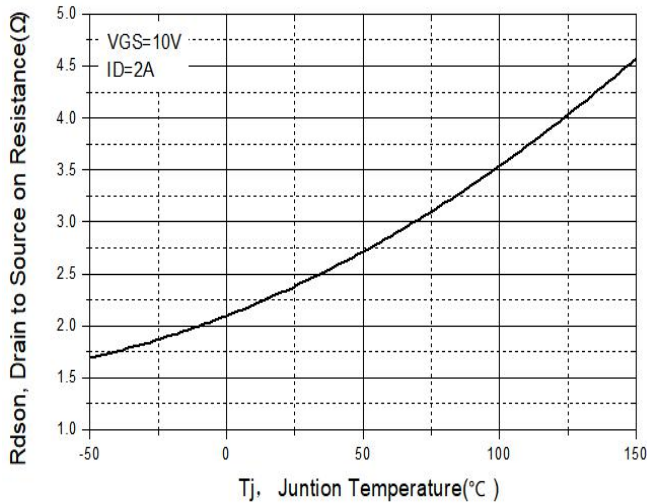


Figure 5 Rdson- Tj Relation

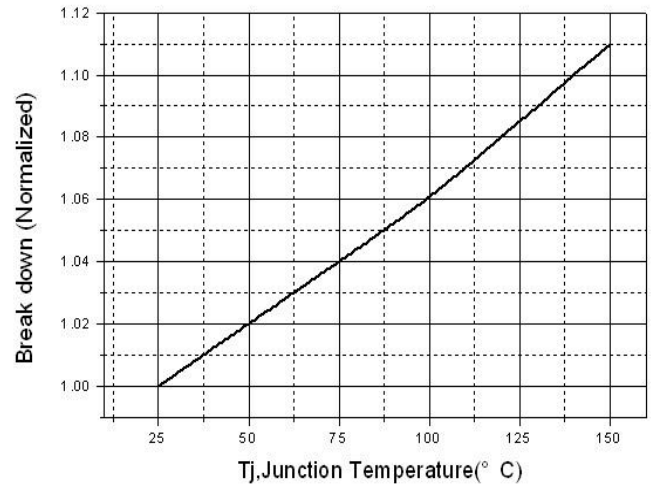


Figure 6 BVDS vs Junction Temperature

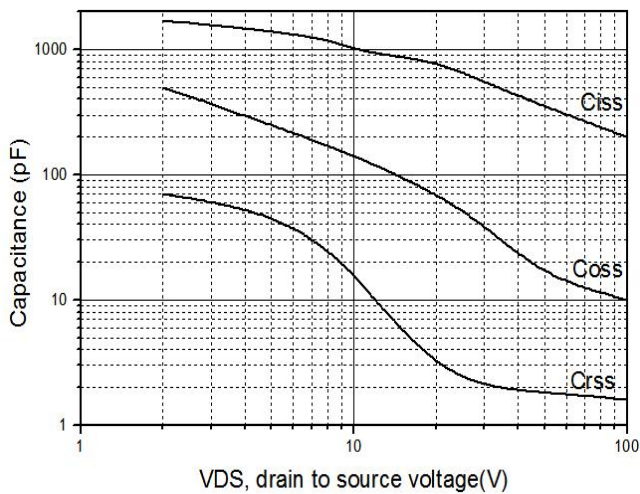


Figure 7 Capacitance vs Vds

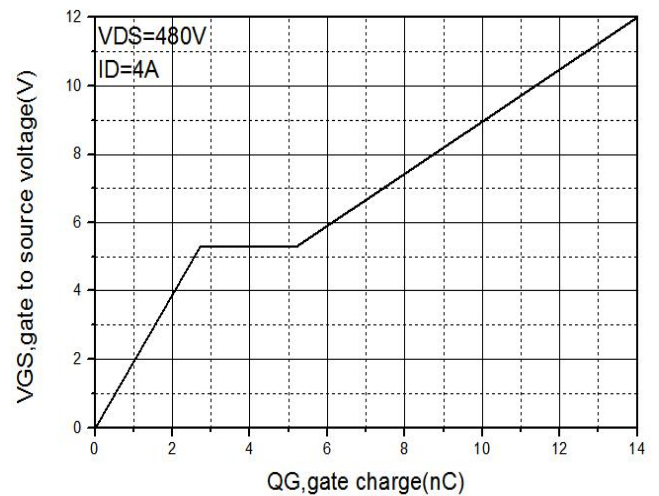


Figure 8 VGS vs QG Characteristics

Typical Characteristics

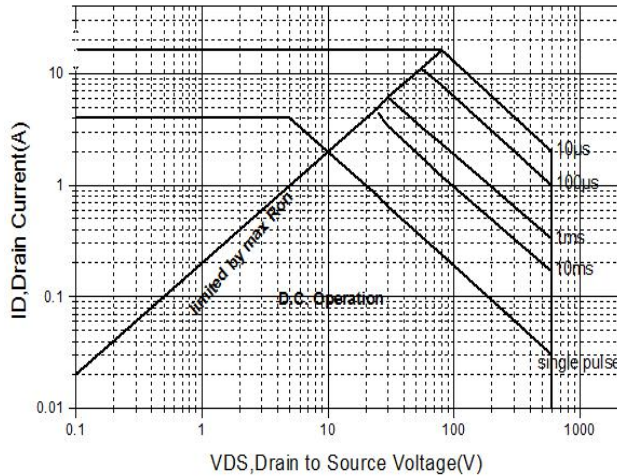


Figure 9 Safe Operation Area

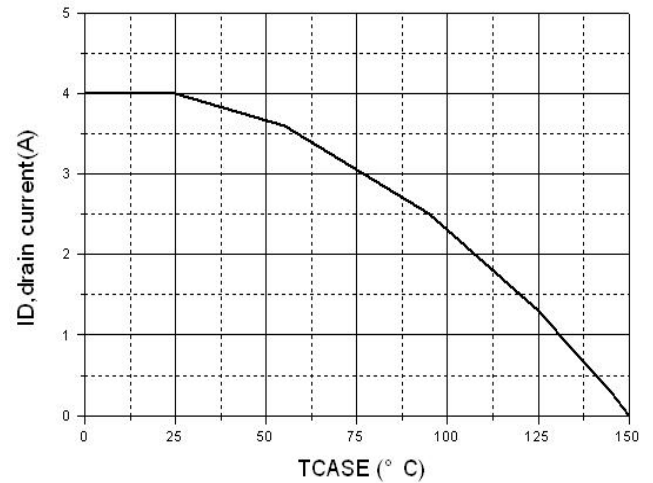


Figure 10 Maximum current attenuation

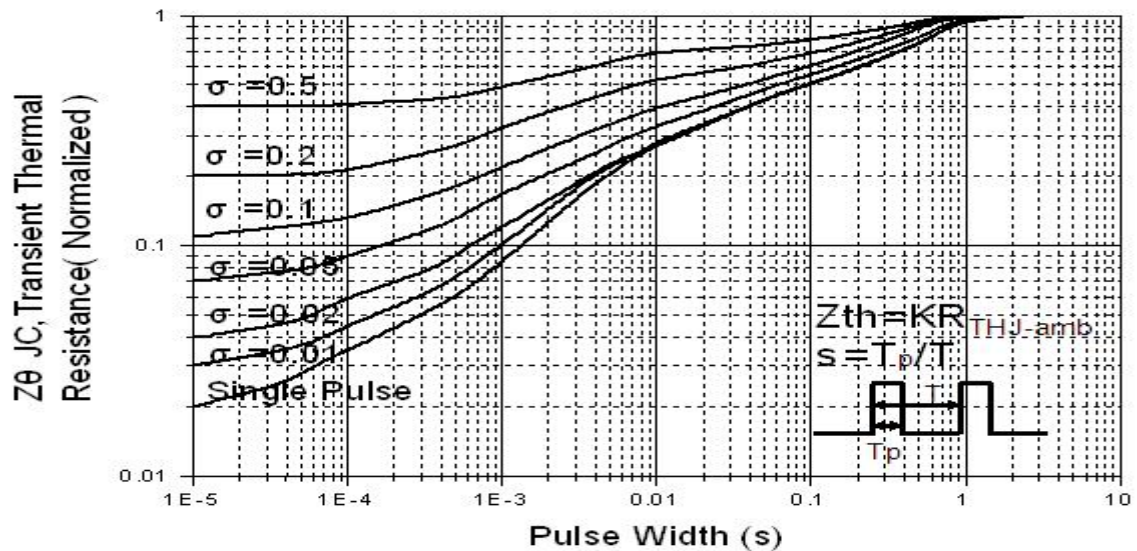
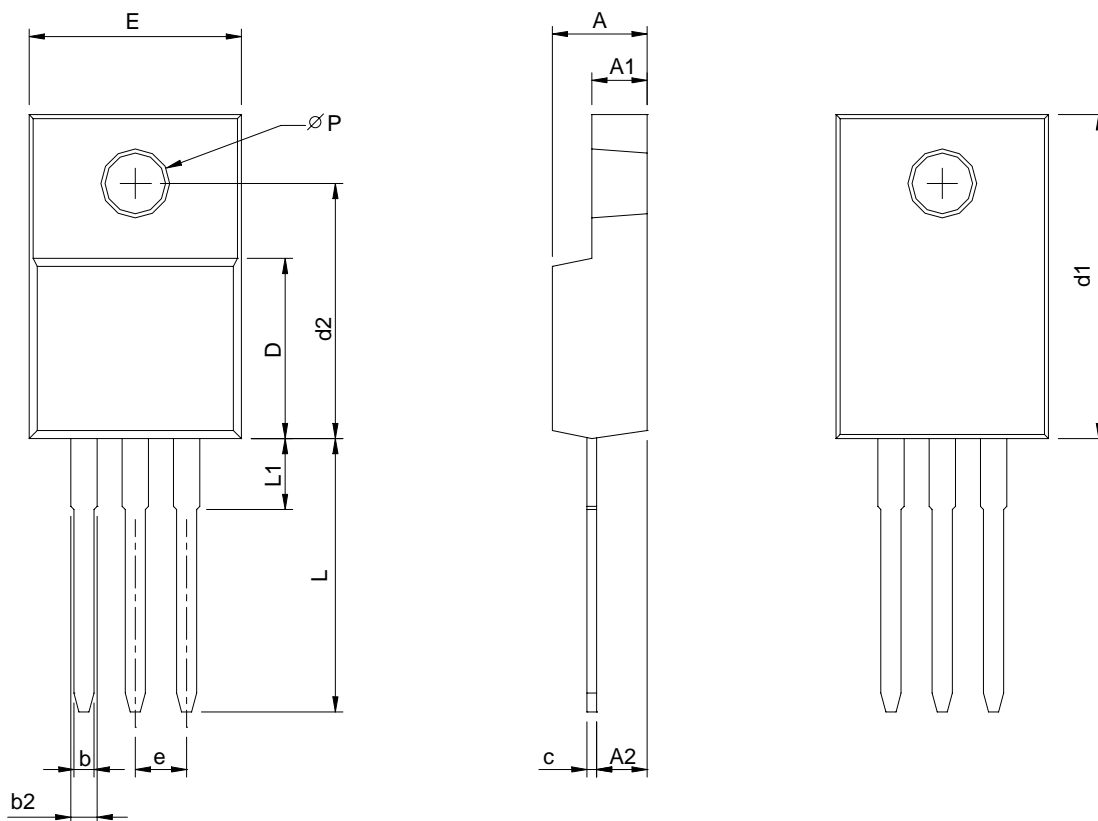


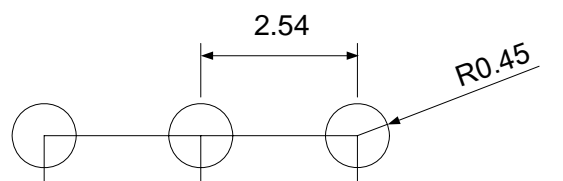
Figure 11 Normalized Maximum Transient Thermal Impedance

Packaging information



SYMBOL	TO-220F-3L			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.20	4.80	0.165	0.189
A1	2.34	3.20	0.092	0.126
A2	2.10	2.90	0.083	0.114
b	0.50	0.90	0.020	0.035
b2	0.91	1.90	0.035	0.075
c	0.30	0.80	0.012	0.031
D	8.10	9.40	0.319	0.370
d1	14.50	16.50	0.571	0.650
d2	12.10	12.90	0.476	0.508
E	9.70	10.70	0.382	0.421
e	2.54 BSC		0.100 BSC	
L	13.00	14.50	0.512	0.570
L1	1.60	4.00	0.063	0.157
P	3.00	3.60	0.118	0.142

RECOMMENDED LAND PATTERN



UNIT: mm

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