

### General Description

The WSF4N65 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 WSF4N65 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

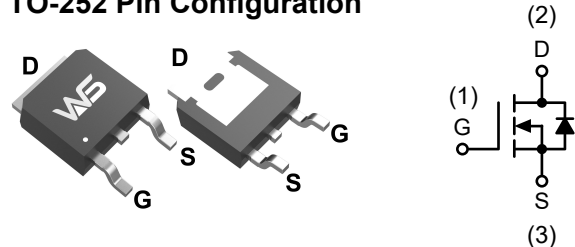
### Product Summary

$BV_{DSS}$	$R_{DSON}$	$I_D$
650V	2.6Ω	4A

### Applications

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

### TO-252 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-Source Voltage	±30	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1.5}$	4	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{1.5}$	2.5	A
$I_{DM}$	Pulsed Drain Current <sup>1,2,5</sup>	16	A
EAS	Single Pulse Avalanche Energy <sup>1</sup>	128	mJ
$P_D$	Total Power Dissipation <sup>1,5</sup>	77	W
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	1.62	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	650	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =250uA	---	0.6	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.5A	---	2.6	3.0	Ω
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	3.0	4.0	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4.57	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =520V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	10	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =40V, I <sub>D</sub> =3.5A	---	5	---	S
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =7A	---	10.2	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2.3	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.1	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω, I <sub>D</sub> =10A.	---	15.5	---	ns
T <sub>r</sub>	Rise Time		---	13	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	40	---	
T <sub>f</sub>	Fall Time		---	16	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	550	---	pF
C <sub>oss</sub>	Output Capacitance		---	46	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	2.3	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,2,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	4	A
I <sub>SM</sub>	Pulsed Source Current <sup>1,2</sup>		---	---	16	A
V <sub>SD</sub>	Diode Forward Voltage <sup>1</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =7A, T <sub>J</sub> =25°C	---	---	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =7A, dI/dt=40A/μs, T <sub>J</sub> =25°C	---	454	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	2076	---	nC

**Notes:**

Note 1 : limited by maximum junction temperature.

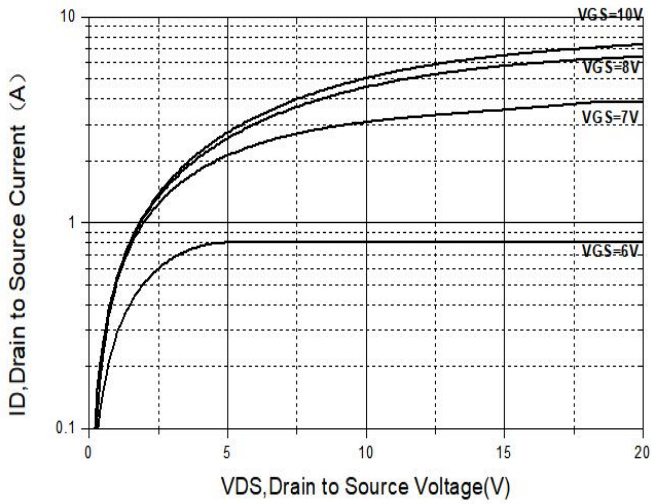
Note 2 : Bond wire current limit.

Note 3 : V<sub>DS</sub>=520V, I<sub>D</sub>=4A.

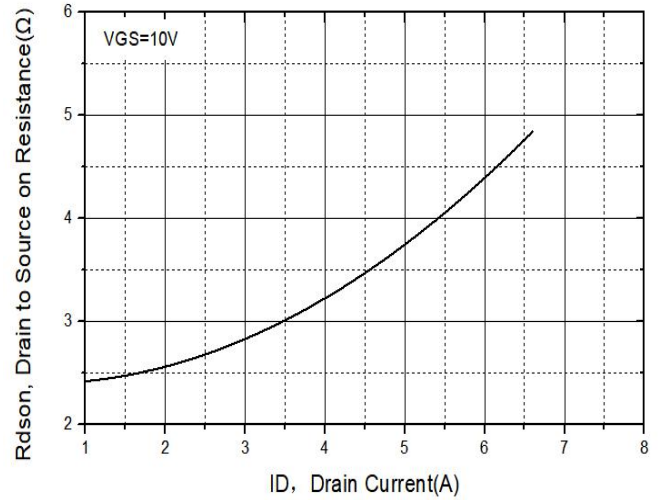
Note 4 : I<sub>D</sub>=0.5A, V<sub>DD</sub>=50V, T<sub>J</sub>=25°C.

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

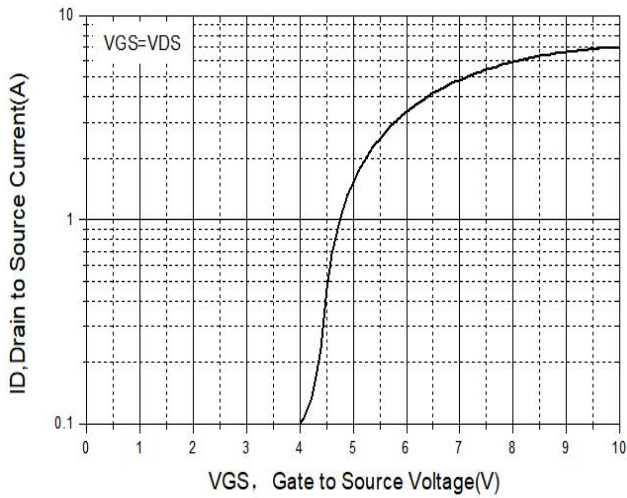
**Typical Characteristics**



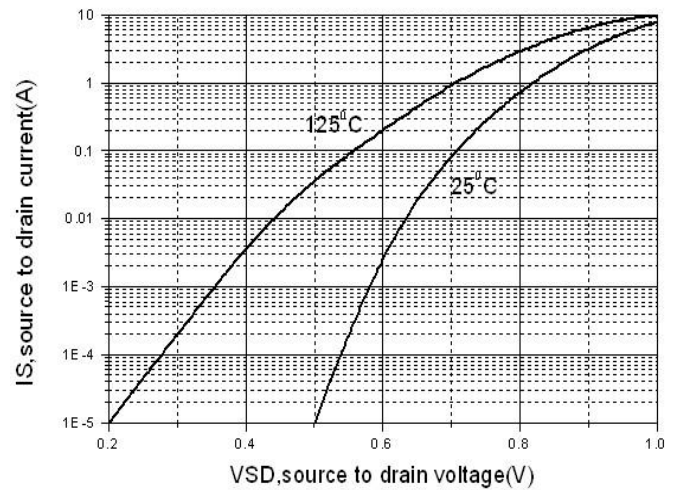
**Figure 1 Output Characteristics**



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

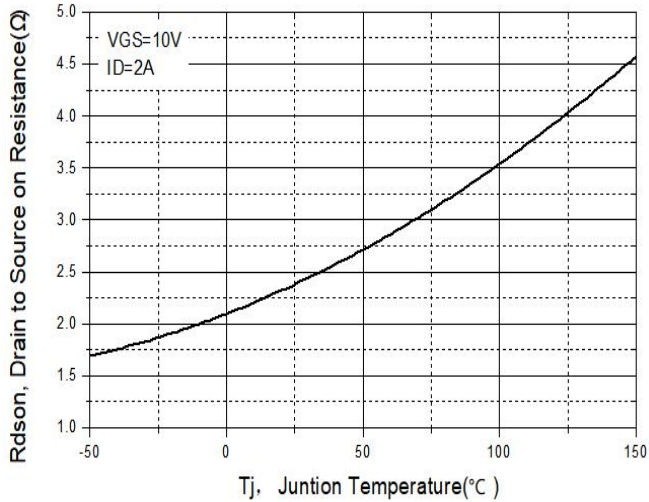


**Figure 2 Transfer Characteristics**

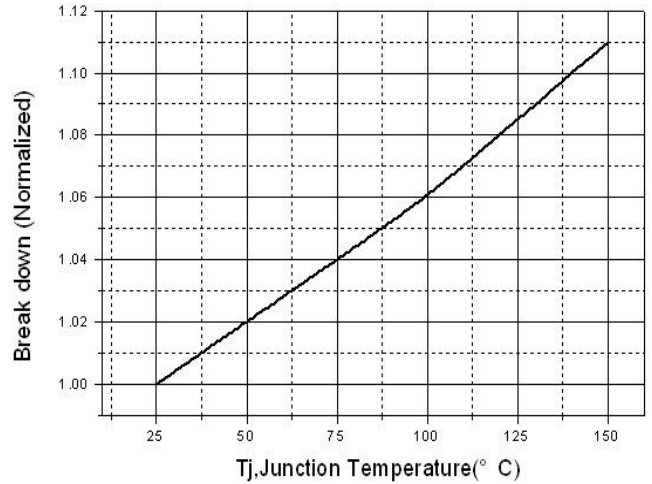


**Figure 4 Body diode Characteristics**

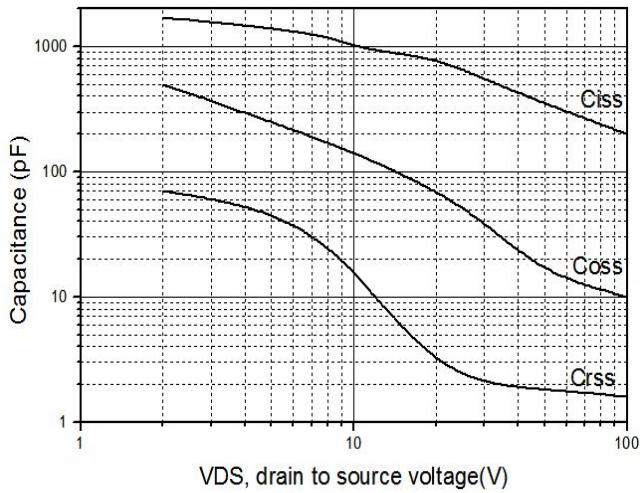
**Typical Characteristics**



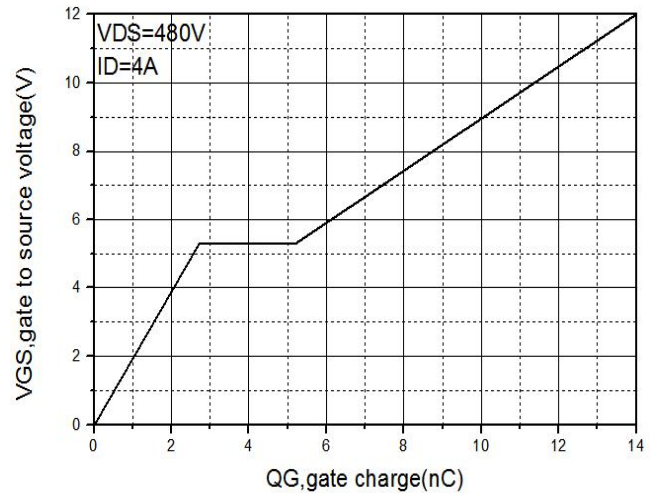
**Figure 5 Rdson- Tj Relation**



**Figure 6 BVDSS vs Junction Temperature**

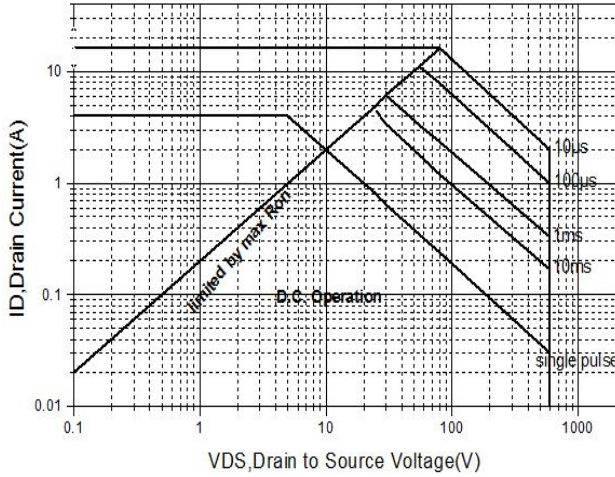


**Figure 7 Capacitance vs Vds**

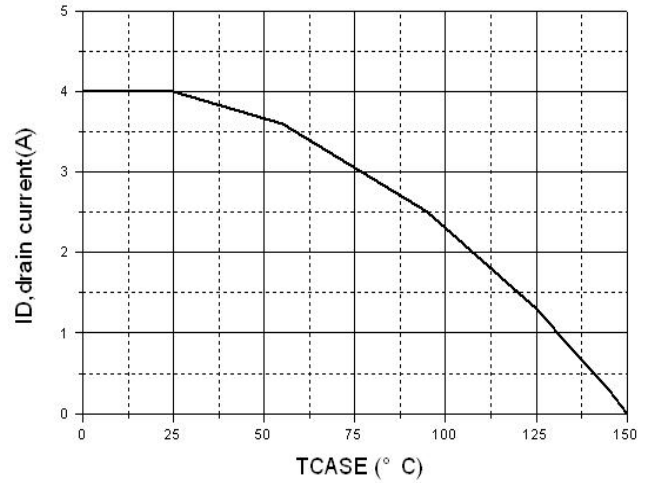


**Figure 8 VGS vs QG Characteristics**

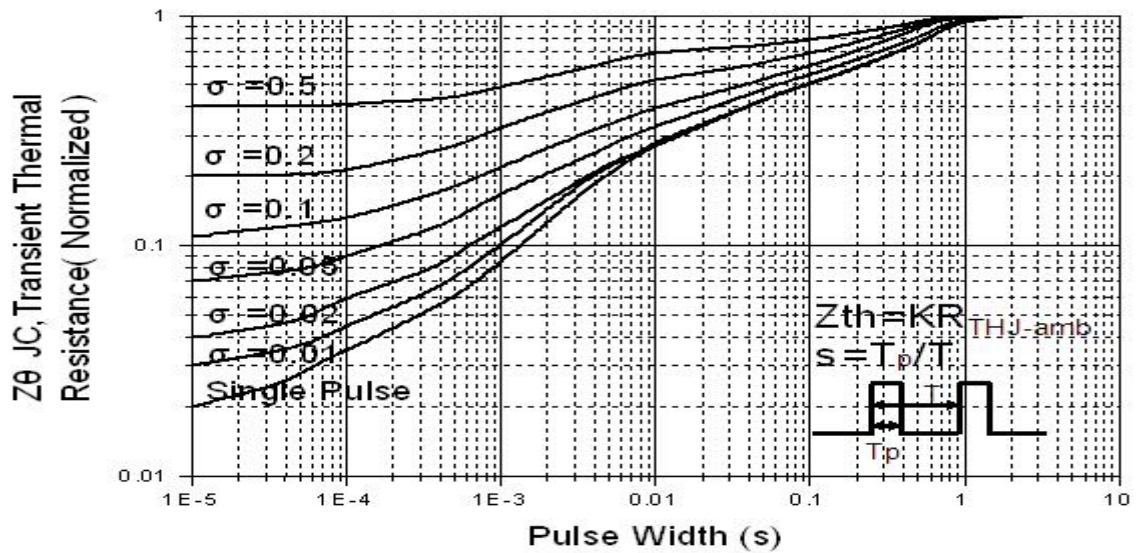
**Typical Characteristics**



**Figure 9 Safe Operation Area**



**Figure 10 Maximum current attenuation**



**Figure 11 Normalized Maximum Transient Thermal Impedance**



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