

## General Description

The WSR10N65F is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

The WSR10N65F 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 C<sub>dv/dt</sub> effect decline
- Green Device Available

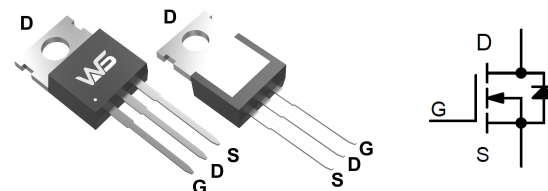
## Product Summary

BV <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
650V	0.8Ω	10A

## Applications

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

## TO-220F Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	650	V
V <sub>GS</sub>	Gate-Source Voltage	± 30	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1,5</sup>	10	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1,5</sup>	6	A
I <sub>DM</sub>	Pulsed Drain Current <sup>1,2,5</sup>	40	A
EAS	Single Pulse Avalanche Energy <sup>1</sup>	900	mJ
P <sub>D</sub>	Total Power Dissipation <sup>1,5</sup>	39	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-ambient <sup>1</sup>	---	62.5	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	3.2	°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	---	0.6	0.8	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>DD</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A	---	21	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	7.5	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	6	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A, R <sub>G</sub> =25Ω.	---	28	---	ns
T <sub>r</sub>	Rise Time		---	70	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	53	---	
T <sub>f</sub>	Fall Time		---	35	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	1120	---	pF
C <sub>oss</sub>	Output Capacitance		---	130	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	4.9	---	

**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	---	---	10	A
I <sub>SM</sub>	Pulsed Source Current <sup>1,2</sup>		---	---	40	A
V <sub>SD</sub>	Diode Forward Voltage <sup>1</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A, T <sub>J</sub> =25°C	---	---	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =10A, dI/dt=40A/μs, T <sub>J</sub> =25°C	---	491	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	2296	---	nC

**Notes:**

Note 1 : limited by maximum junction temperature.

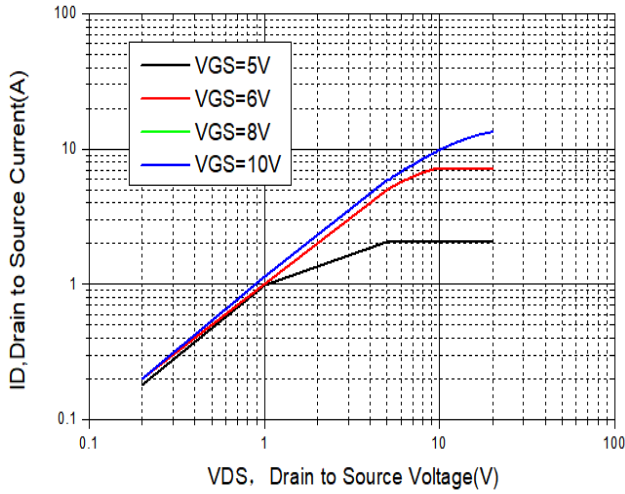
Note 2 : Bond wire current limit.

Note 3 : V<sub>DS</sub>=520V, I<sub>D</sub>=10A.

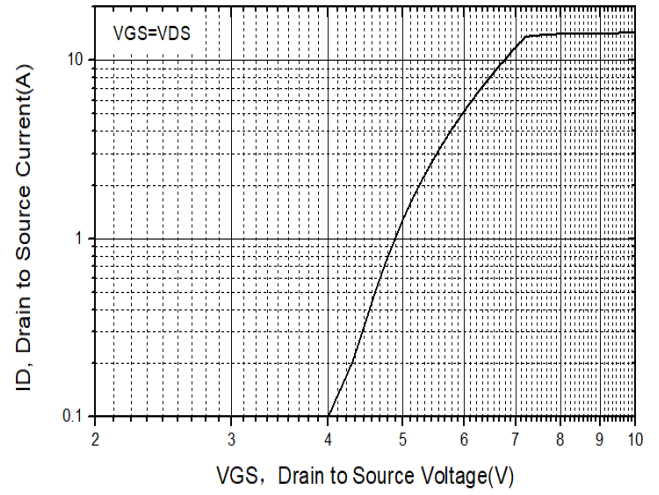
Note 4 : I<sub>D</sub>=0.5A, V<sub>DD</sub>=50V, T<sub>J</sub>=25°C.

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

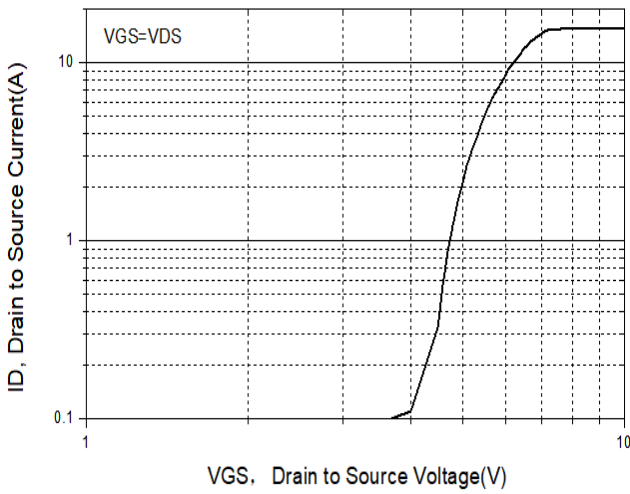
**Typical Characteristics**



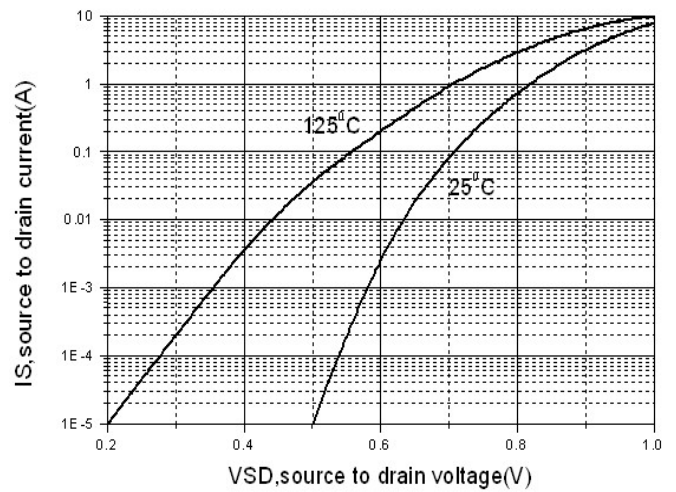
**Figure 1 Output Characteristics**



**Figure 3  $R_{dson}$ - $I_D$  Characteristics**

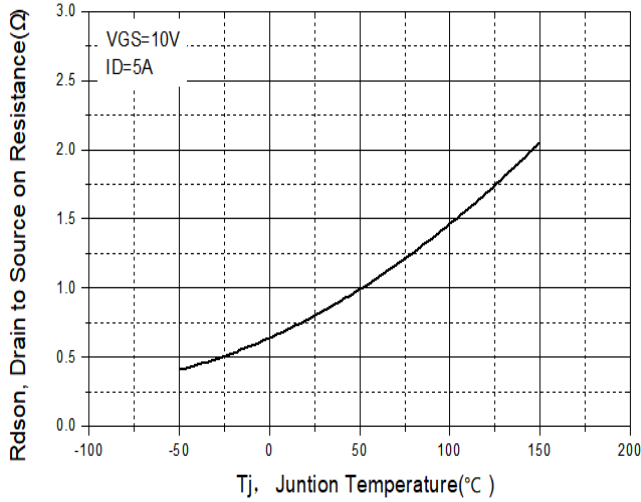


**Figure 2 Transfer Characteristics**

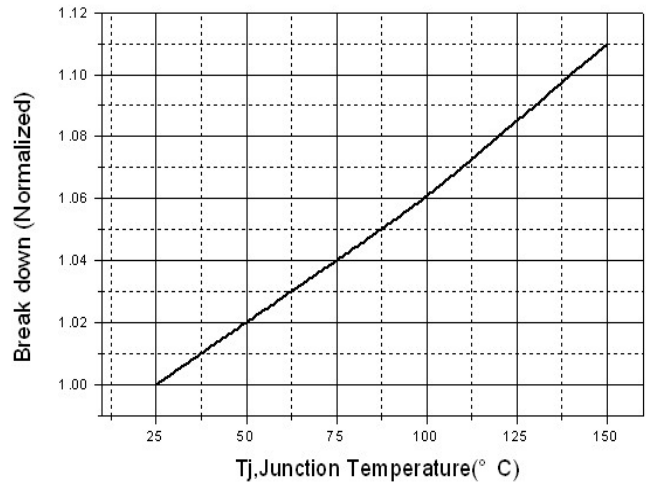


**Figure 4 Body diode Characteristics**

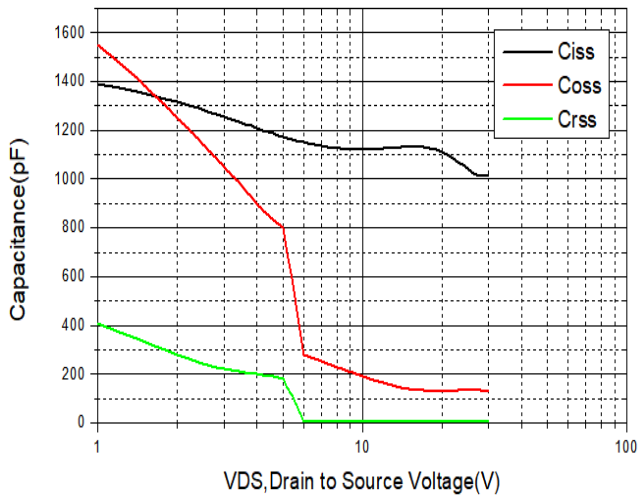
**Typical Characteristics**



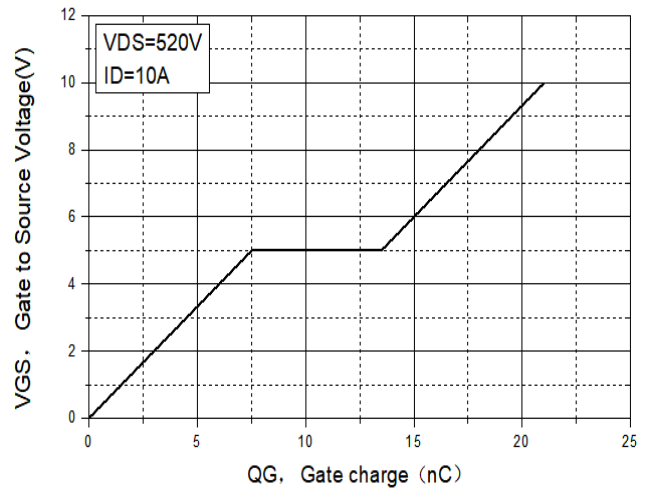
**Figure 5 Rdson- Tj Relation**



**Figure 6 BVDSS vs Junction Temperature**

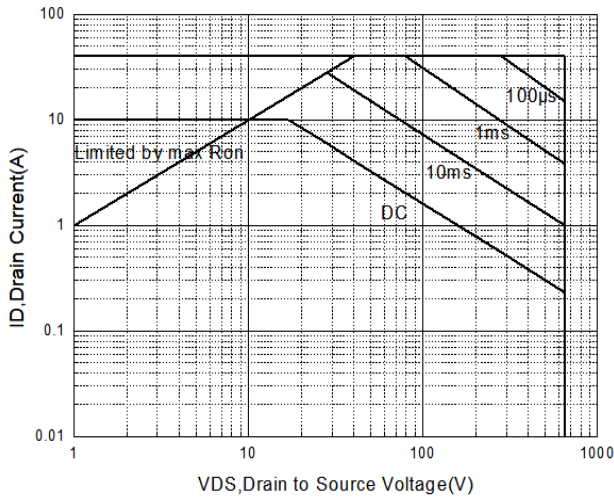


**Figure 7 Capacitance vs Vds**

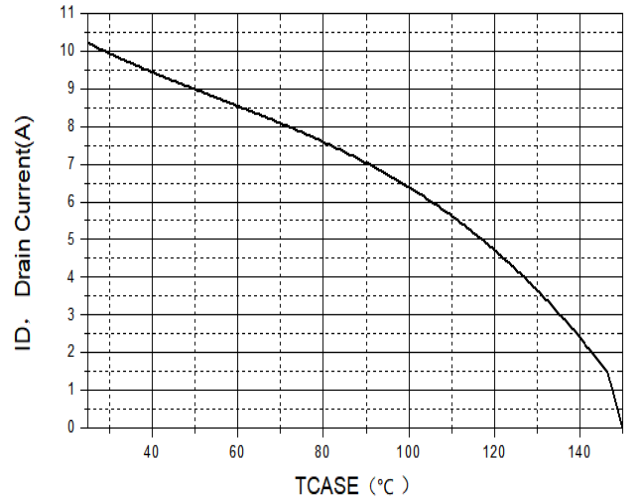


**Figure 8 VGS vs QG Characteristics**

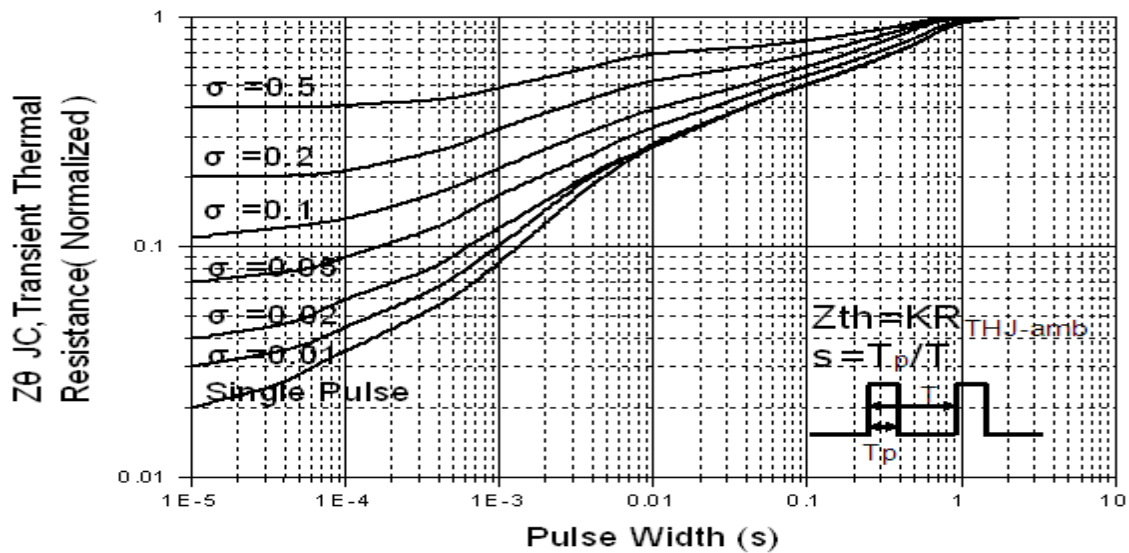
**Typical Characteristics**



**Figure 9 Safe Operation Area**



**Figure 10 Maximum current attenuation**



**Figure 11 Normalized Maximum Transient Thermal Impedance**



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