

### General Description

The WSC5N20A 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 WSC5N20A 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
- 100% EAS Guaranteed
- Green Device Available

### Product Summary

BVDSS	RDSON	ID
200V	0.6Ω	5A

### Applications

- Telecom 48V input Forward Converters

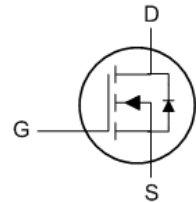
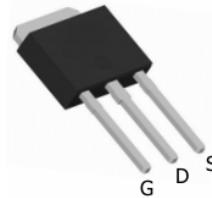
### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	200	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	5	A
$I_{DM}$	Pulsed Drain Current	20	A
$P_D$	Total Power Dissipation	43	W
$T_J, T_{STG}$	Operating Junction and storage Temperature Range	-55 to 175	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	50	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s)	---	35	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	3.5	°C/W

### TO-251/ I-Pak Pin Configuration



**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	200	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.23	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	---	0.52	0.6	Ω
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	1.7	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-6.16	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =200V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	25	uA
		V <sub>DS</sub> =160V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	200	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	---	---	±100	nA

**Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =50V, I <sub>D</sub> =2.9A	2.6	---	---	S
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =160V, V <sub>GS</sub> =10V, I <sub>D</sub> =2.9A	---	15	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2.4	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	6.1	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =100V	---	6.4	---	ns
T <sub>r</sub>	Rise Time	V <sub>GS</sub> =10V	---	11	---	
T <sub>d(off)</sub>	Turn-Off Delay Time	R <sub>G</sub> =24Ω	---	20	---	
T <sub>f</sub>	Fall Time	I <sub>D</sub> =2.9A	---	12	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V	---	300	---	pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V	---	53	---	
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1MHz	---	15	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	5	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =2.9A, T <sub>J</sub> =25°C	---	---	1.2	V

**Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
E <sub>AS</sub>	Single Pulse Avalanche Energy	V <sub>GS</sub> =10V, L=0.1mH, I <sub>AS</sub> =2.9A	---	---	46	mJ
E <sub>AR</sub>	Repetitive Avalanche Energy	V <sub>GS</sub> =10V, L=0.1mH, I <sub>AS</sub> =2.9A	---	---	4.3	mJ

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, t<10sec.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=100V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=2.9A
- 4.The power dissipation is limited by 175°C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

Typical Characteristics

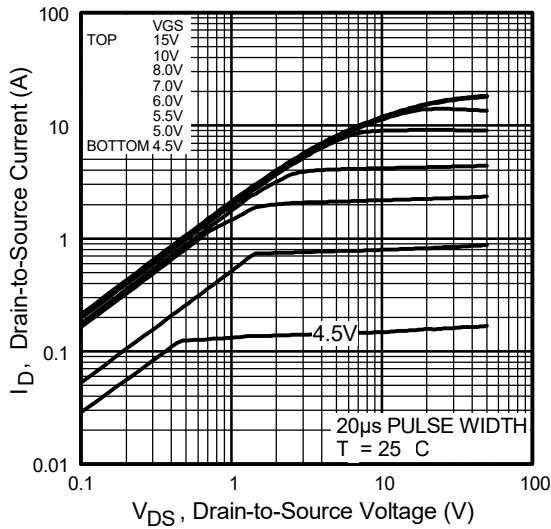


Fig 1. Typical Output Characteristics

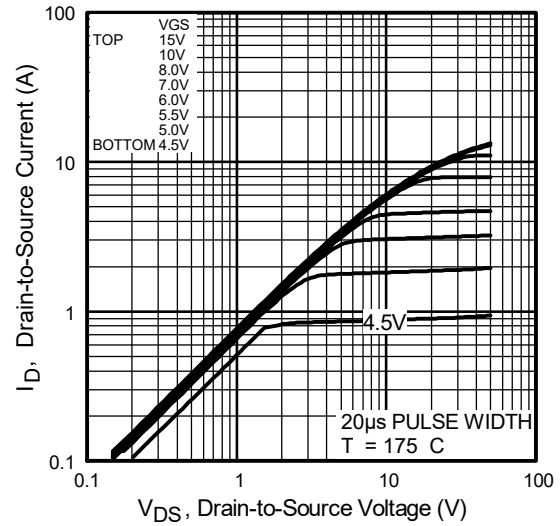


Fig 2. Typical Output Characteristics

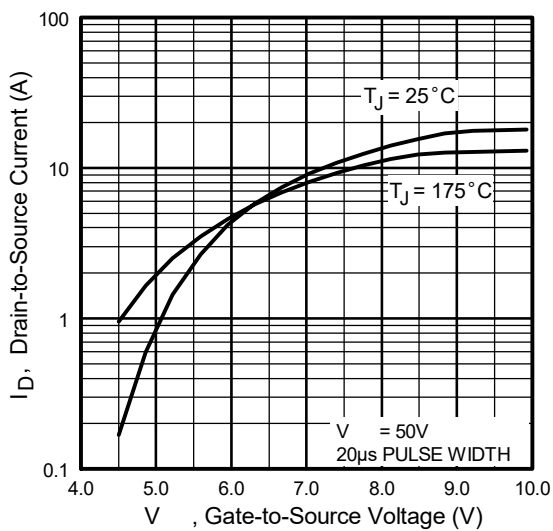


Fig 3. Typical Transfer Characteristics

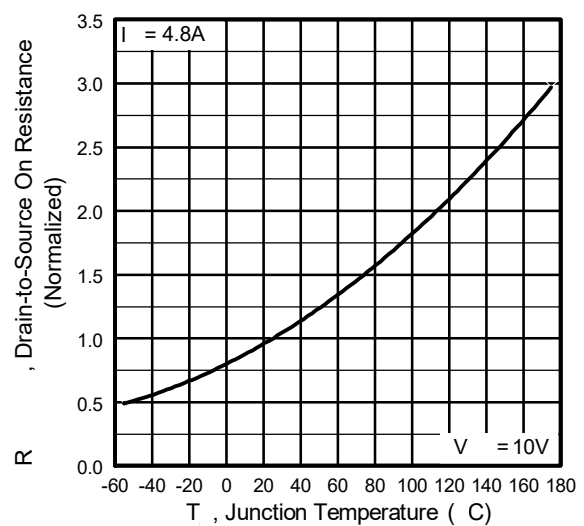
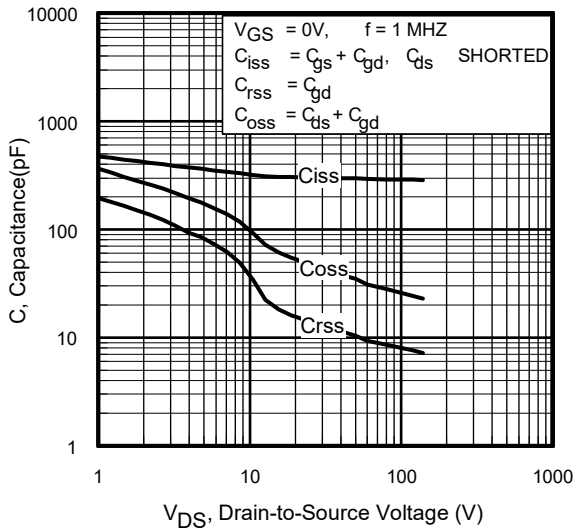
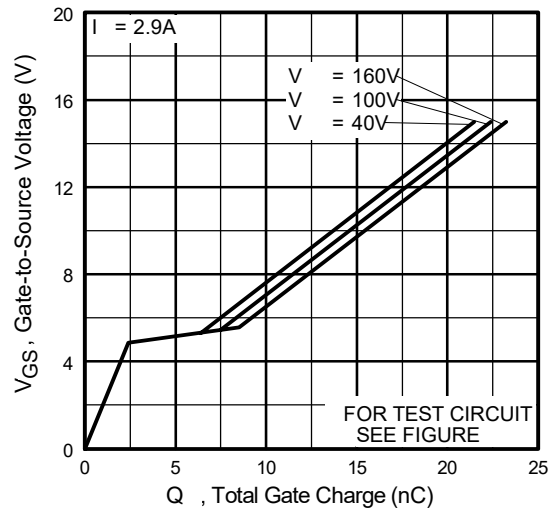


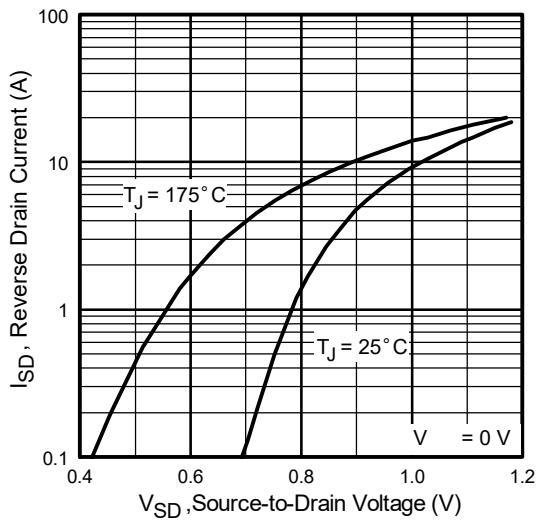
Fig 4. Normalized On-Resistance Vs. Temperature



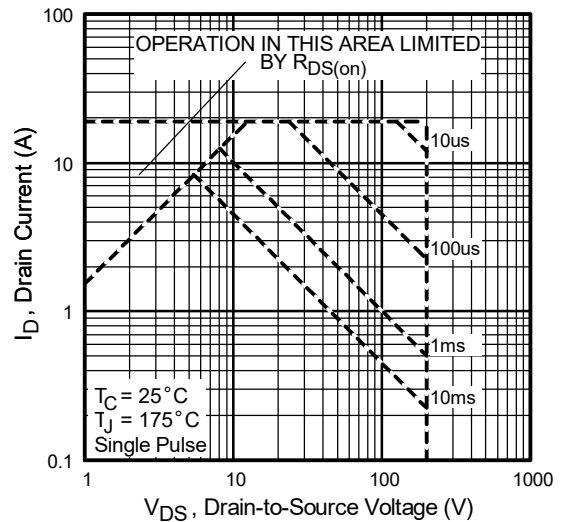
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



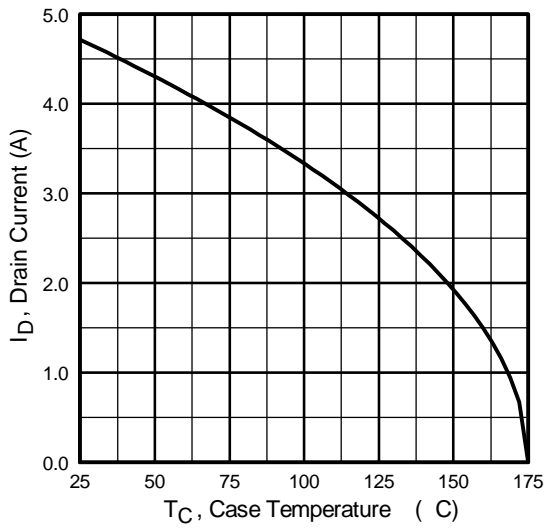
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



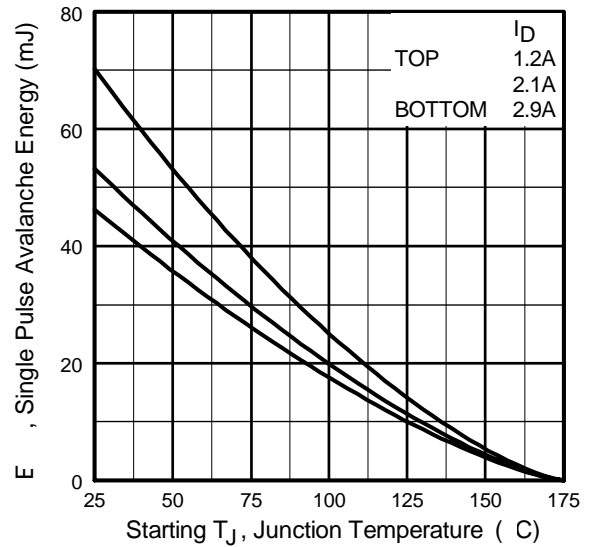
**Fig 7.** Typical Source-Drain Diode Forward Voltage



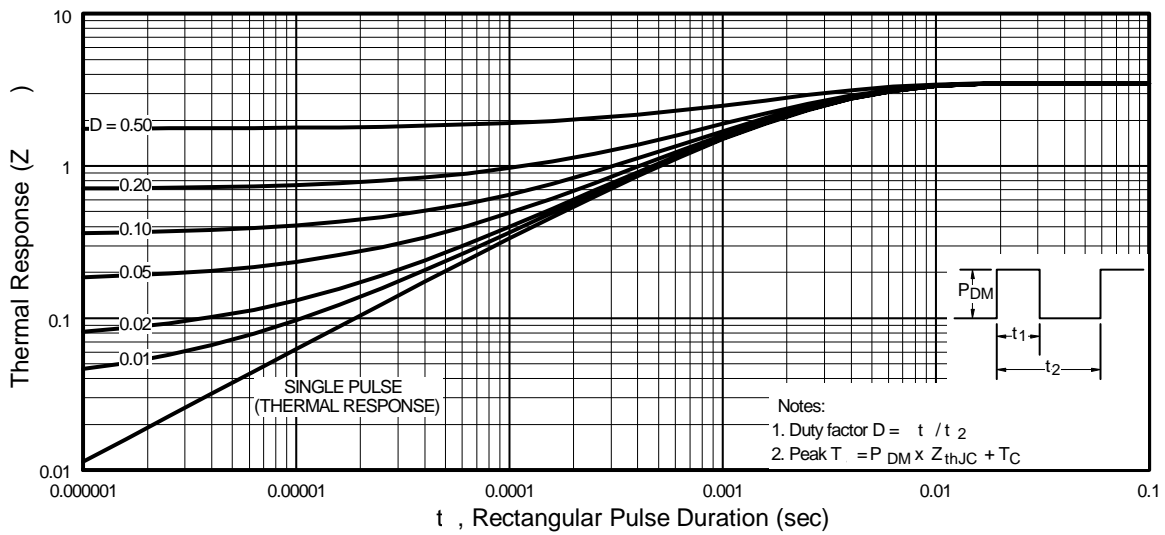
**Fig 8.** Maximum Safe Operating Area



**Fig 9.** Maximum Drain Current Vs. Case Temperature



**Fig 10.** Maximum Avalanche Energy Vs. Drain Current



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case



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