

## General Description

The WSR180N15 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 WSR180N15 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

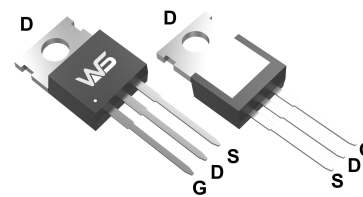
## Product Summary

BVDSS	RDSON	ID
150V	6.2mΩ	180A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System

## TO-220 Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	150	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Continuous Drain Current, V <sub>GS</sub> @ 10V(T <sub>C</sub> =25°C)	180	A
I <sub>DM</sub>	Pulsed Drain Current	550	A
EAS	Single Pulse Avalanche Energy	506	mJ
P <sub>D</sub>	Total Power Dissipation... <sub>c</sub> =25°C)	210	W
RθJA	Thermal resistance, junction-ambient	40	°C/W
RθJC	Thermal resistance, junction-case	0.84	°C/W
T <sub>STG</sub>	Storage Temperature Range	-55 to 155	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 155	°C

**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	150	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	---	6.2	7.5	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	2.9	4.0	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	72	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	18	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	10	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =50V, V <sub>GS</sub> =10V R <sub>G</sub> =3Ω, I <sub>D</sub> =20A	---	22	---	ns
T <sub>r</sub>	Rise Time		---	115	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	44	---	
T <sub>f</sub>	Fall Time		---	105	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	---	5240	---	pF
C <sub>oss</sub>	Output Capacitance		---	412	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	30	---	

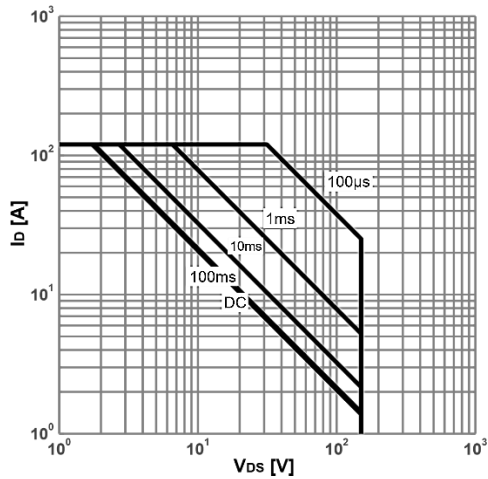
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	150	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	500	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A, T <sub>J</sub> =25°C	---	---	1.3	V

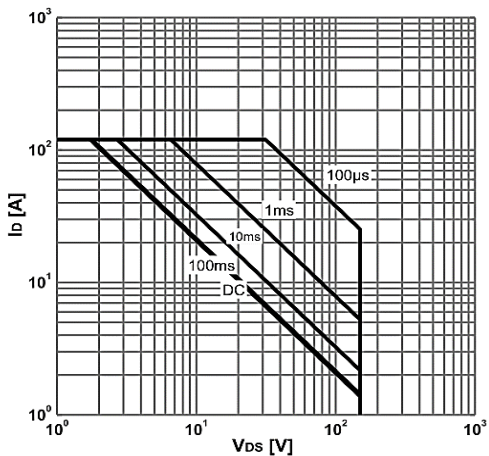
**■ Note**

- 1) Repetitive rating; pulse width limited by max. junction temperature.
- 2) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 3) The value of RθJA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.
- 4) V<sub>DD</sub>=50 V, R<sub>G</sub>=50 Ω, L=0.5 mH, starting T<sub>J</sub>=25 °C.
- 5) Calculated continuous current based on maximum allowable junction temperature.

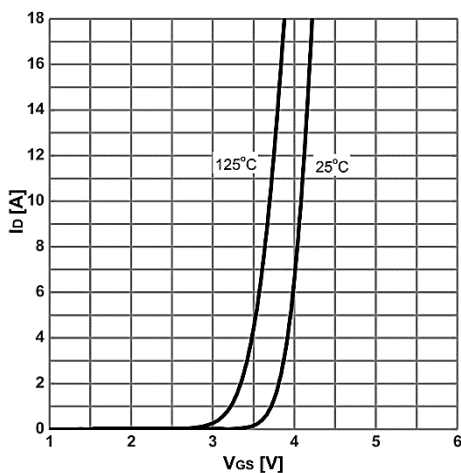
**Typical Characteristics**



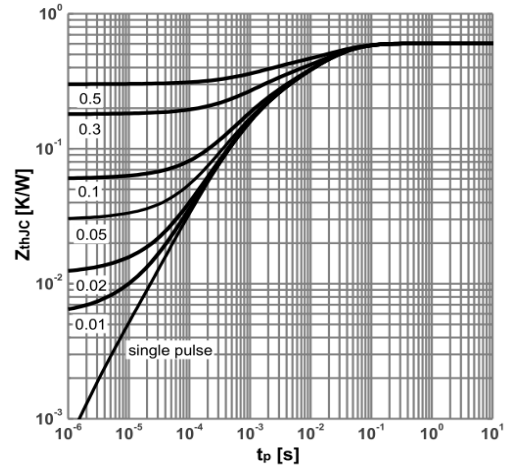
**Figure 1. Power dissipation**



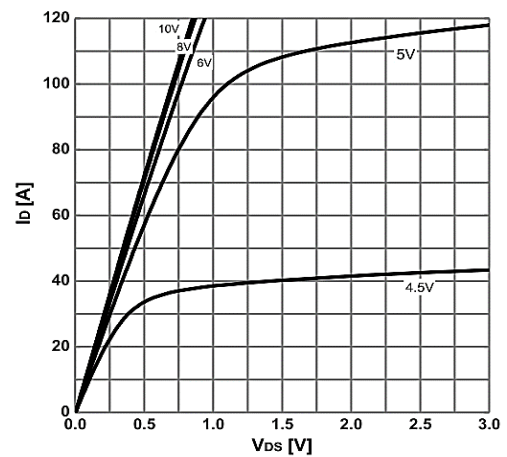
**Figure 3. Safe operating area**



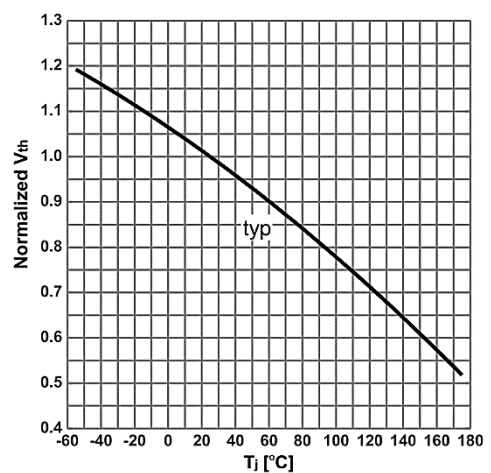
**Figure 5. Typ. transfer characteristics**



**Figure 2. Max. transient thermal impedance**



**Figure 4. Typ. output characteristics**



**Figure 6. Gate threshold voltage vs. Junction Temperature**

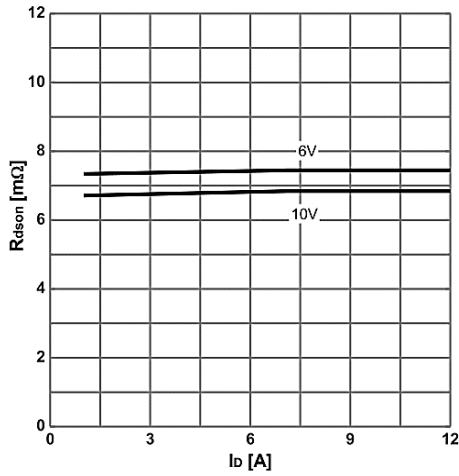


Figure 7. On-state resistance vs. Drain current

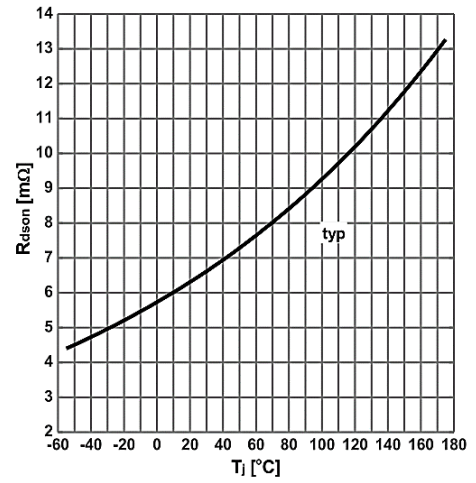


Figure 8. On-state resistance vs. Junction temperature

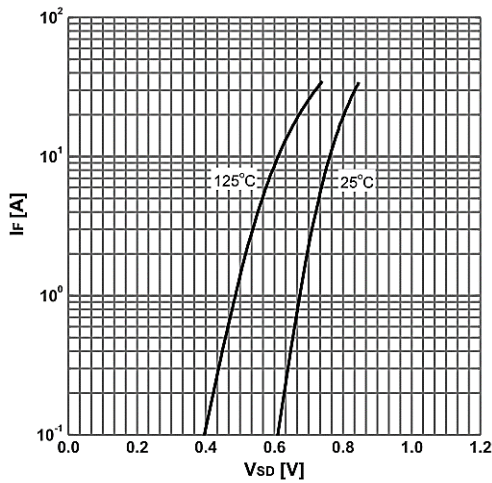


Figure 9. Forward characteristics of reverse diode

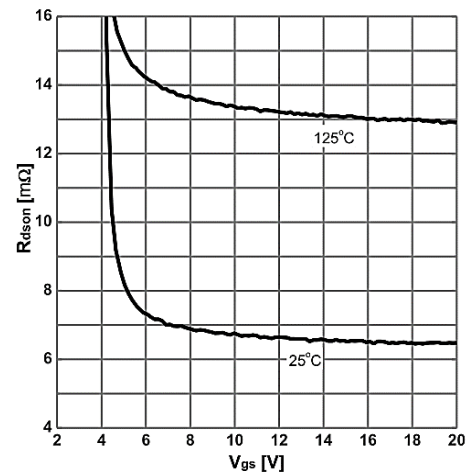


Figure 10. On-state resistance vs. Vgs characteristics

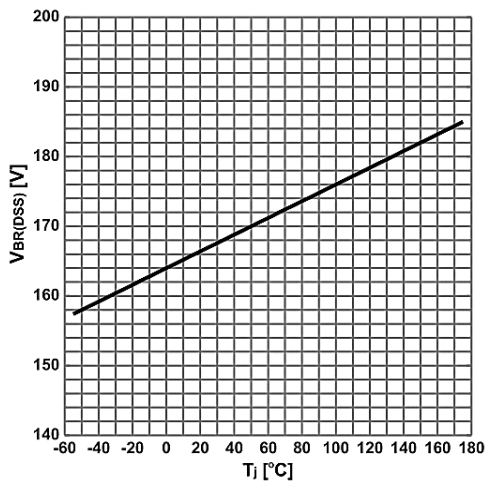


Figure 10: Breakdown Voltage Variation vs. Temperature

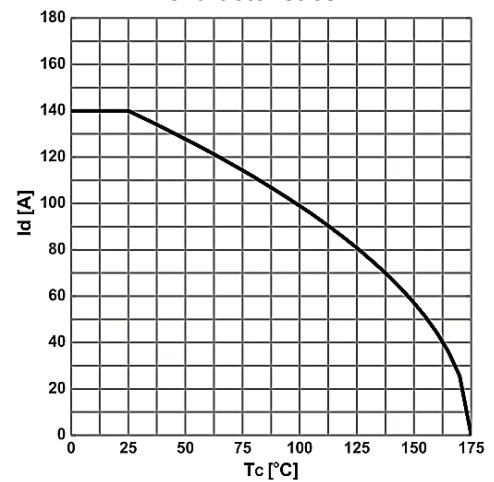


Figure 11: Maximum Drain Current



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