

### General Description

The WSF15N10A uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

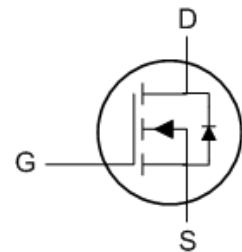
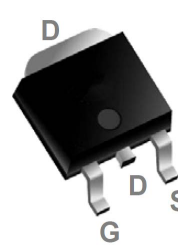
### Product Summary

BVDSS	RDSON	ID
100V	90mΩ	15A

### Features

- High density cell design for ultra low  $R_{ds}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

### TO-252 Pin Configuration



### Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	7	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	40	A
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	40	W
	Derating factor	0.27	W/°C
EAS	Single Pulse Avalanche Energy <sup>3</sup>	20	mJ
$T_J$ $T_{STG}$	Operating Junction Temperature Range	-55 to 170	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	---	50	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	3.8	°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	100	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.098	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =5A	---	90	110	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A	---	110	150	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	1.5	2.5	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	nA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	uA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =5A	3.5	---	---	S
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =5A	---	21.5	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	6.0	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω I <sub>D</sub> =1A, R <sub>L</sub> =30Ω	---	11	24	ns
T <sub>r</sub>	Rise Time		---	7.4	15	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	35	45	
T <sub>f</sub>	Fall Time		---	9.1	12	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz	---	730	---	pF
C <sub>oss</sub>	Output Capacitance		---	37	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	27	---	

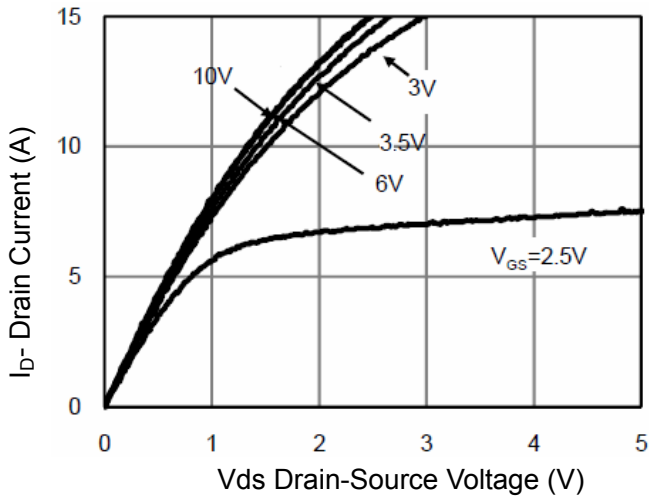
**Diode Characteristics**

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	---	---	10	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A, T <sub>J</sub> =25°C	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =10A, dI/dt=100A/μs, T <sub>J</sub> =25°C	17	21	61	nS
Q <sub>rr</sub>	Reverse Recovery Charge		61	97	113	nC

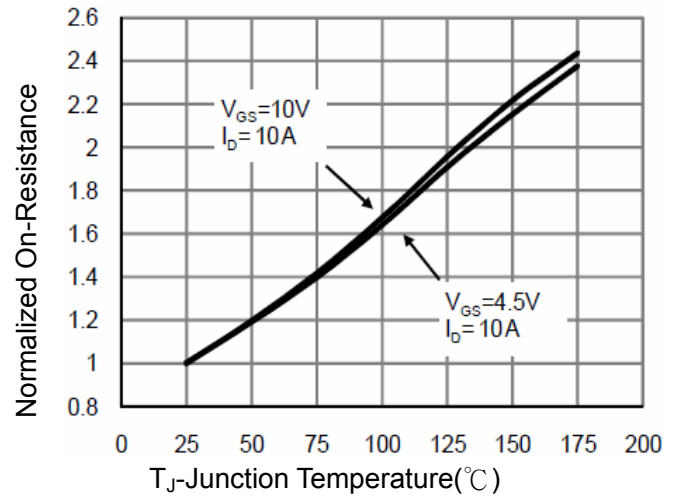
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25

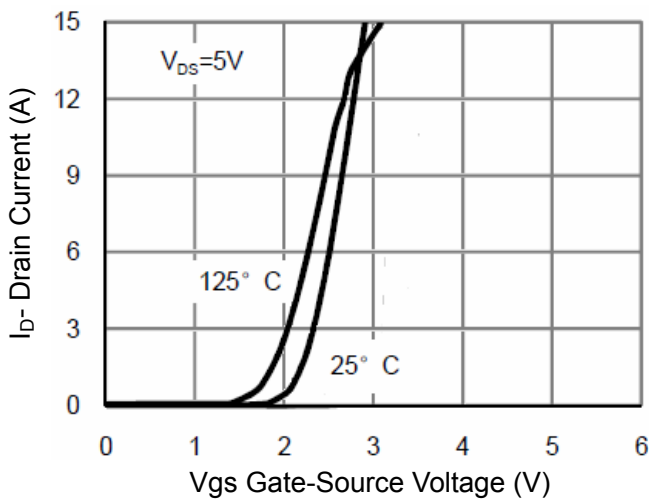
**Typical Characteristics**



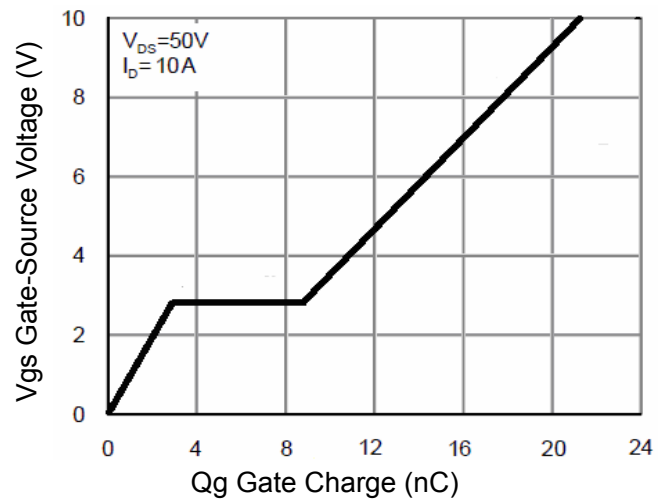
**Figure 1 Output Characteristics**



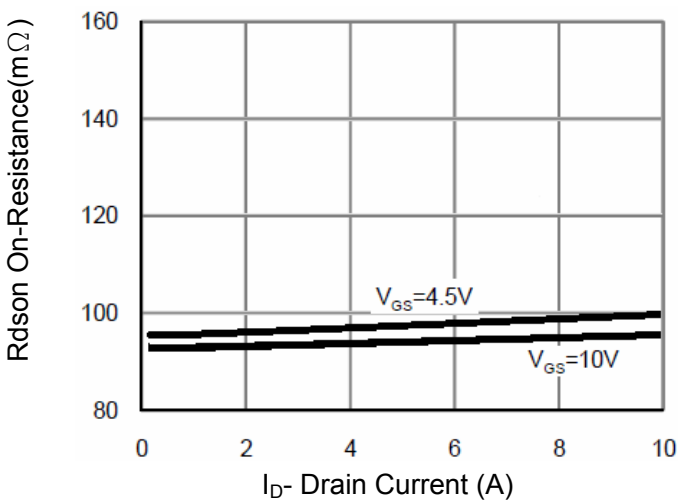
**Figure 4 Rdson-Junction Temperature**



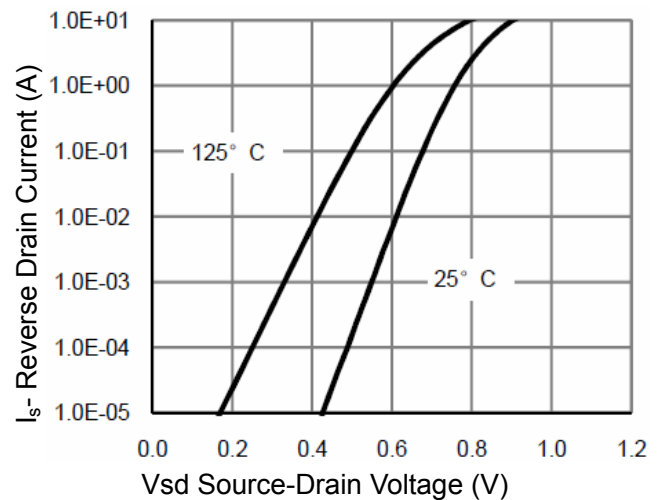
**Figure 2 Transfer Characteristics**



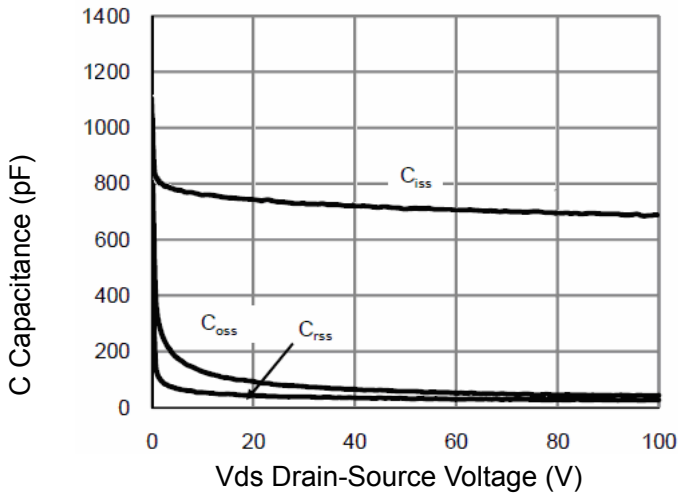
**Figure 5 Gate Charge**



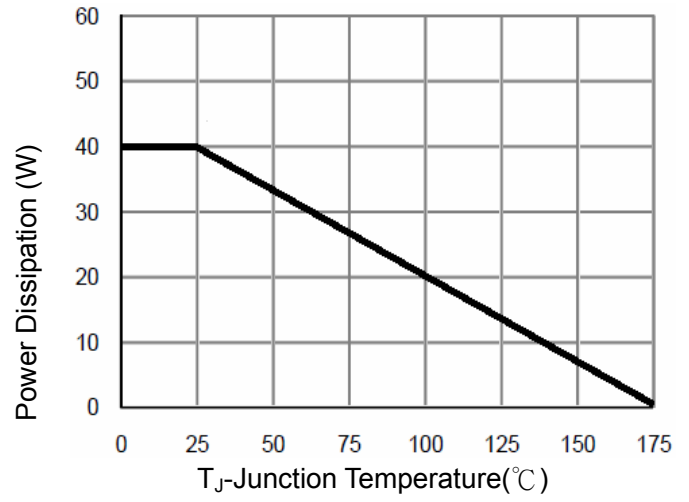
**Figure 3 Rdson- Drain Current**



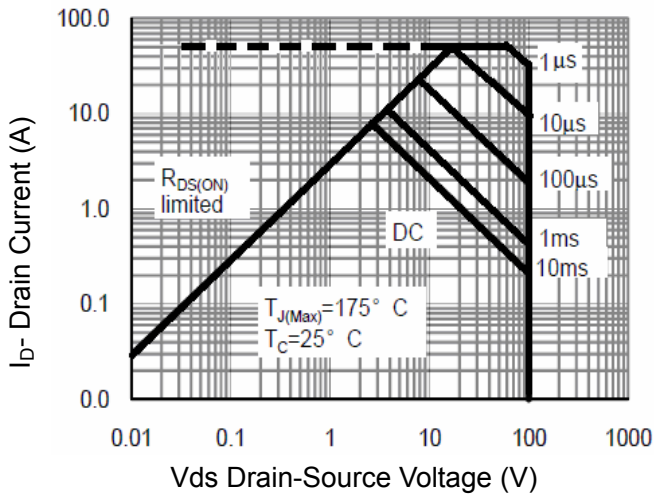
**Figure 6 Source- Drain Diode Forward**



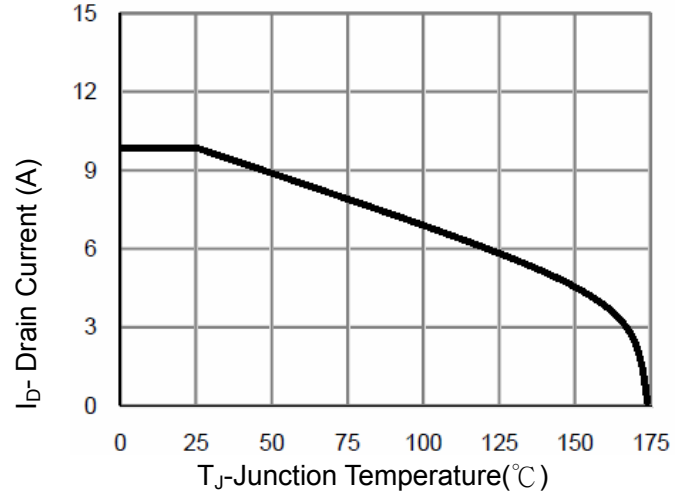
**Figure 7 Capacitance vs Vds**



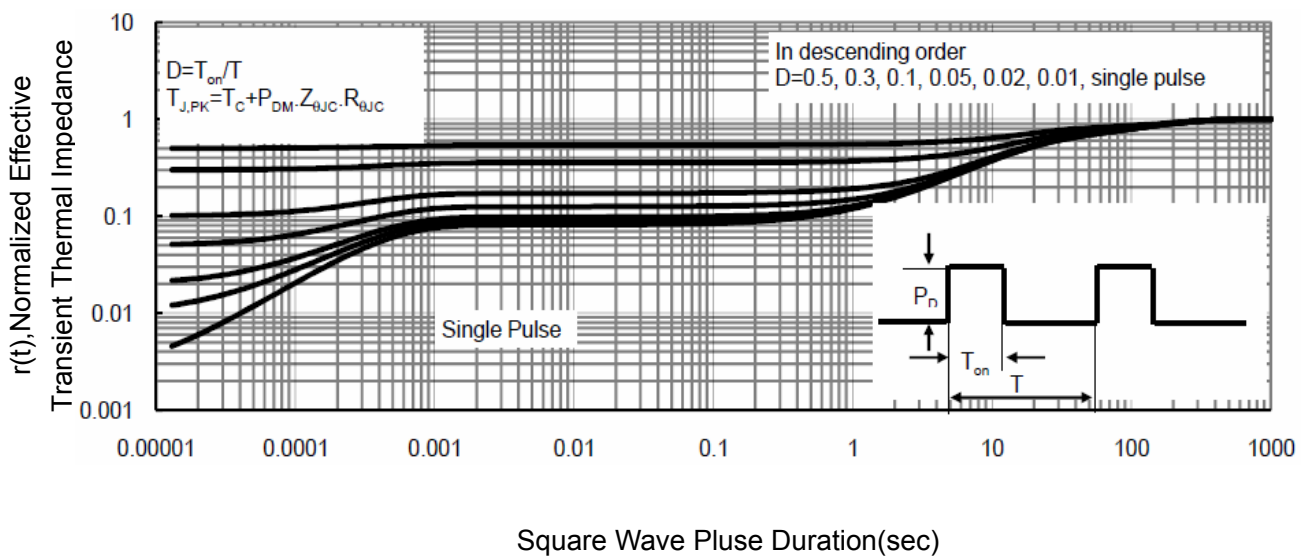
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**



**Figure 10 Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

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