

Features

- 650V, 20A
- $R_{DS(ON)} = 0.19\Omega$ (Max.) @ $V_{GS} = 10V, I_D = 10A$
- Very low FOM $R_{DS(ON)}XQg$
- Extremely low switching loss
- Good stability and uniformity

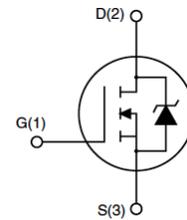
Application

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction(PFC)

Package



WFF20N65SAH



Absolute Maximum Ratings $T_C=25^\circ C$ unless otherwise specified

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	650	V
V_{GSS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current ^{note1}	20	A
	$T_C = 25^\circ C$		
I_{DM}	Pulsed Drain Current ^{note2}	60	A
E_{AS}	Single Pulsed Avalanche Energy ^{note3}	480	mJ
P_D	Power Dissipation	52	W
	$T_C = 25^\circ C$		
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.4	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	70	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

*Drain current limited by maximum junction temperature

Electrical Characteristics $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5	3.5	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 10A$	-	0.16	0.19	Ω
g_{fs}	Forward Transconductance	$V_{GS} = 10V, I_D = 10A$	-	18.7	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 100V, V_{GS} = 0V,$ $f = 1.0MHz$	-	1484	-	pF
C_{oss}	Output Capacitance		-	66	-	pF
C_{rss}	Reverse Transfer Capacitance		-	1	-	pF
Q_g	Total Gate Charge	$V_{DS} = 325V, I_D = 20A,$ $V_{GS} = 10V$	-	33.8	-	nC
Q_{gs}	Gate-Source Charge		-	7.8	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	12.9	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325V, I_D = 20A,$ $R_G = 25\Omega$	-	30	-	ns
t_r	Turn-On Rise Time		-	41	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	130	-	ns
t_f	Turn-Off Fall Time		-	31	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current	-	-	20	-	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current	-	-	60	-	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_{SD} = 20A$	-	0.9	1.2	V
t_{rr}	Reverse Recovery Time	$I_S = 20A, V_{GS} = 0V,$ $dI/dt = 100A/\mu s$	-	296	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.35	-	μC

Notes

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. $L = 60mH, I_{AS} = 4A, V_{DD} = 50V, R_G = 25\Omega$, Starting at $T_J = 25^{\circ}\text{C}$
4. $I_{SD} \leq I_D, di/dt = 100A/\mu s, V_{DD} \leq 400V$, Starting at $T_J = 25^{\circ}\text{C}$.

Typical Performance Characteristics

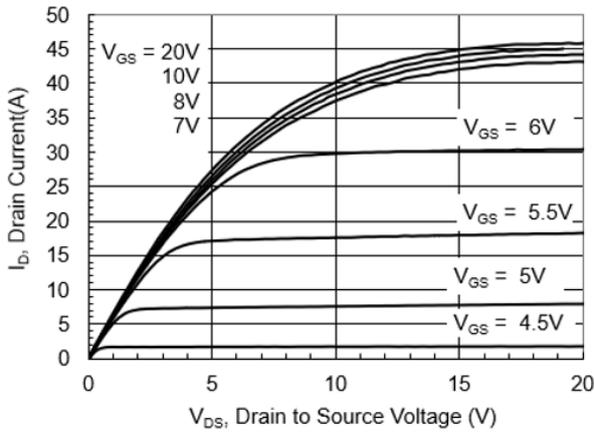


Figure 1. Output Characteristics

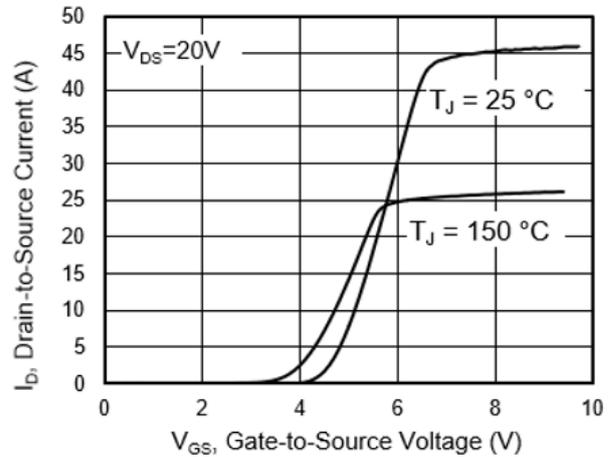


Figure 2. Transfer Characteristics

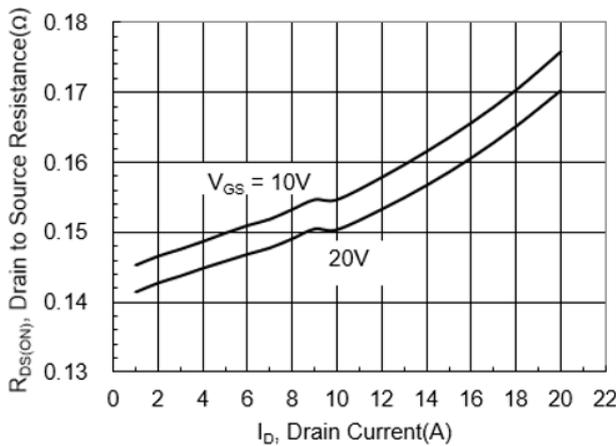


Figure 3. On-resistance vs. Drain Current

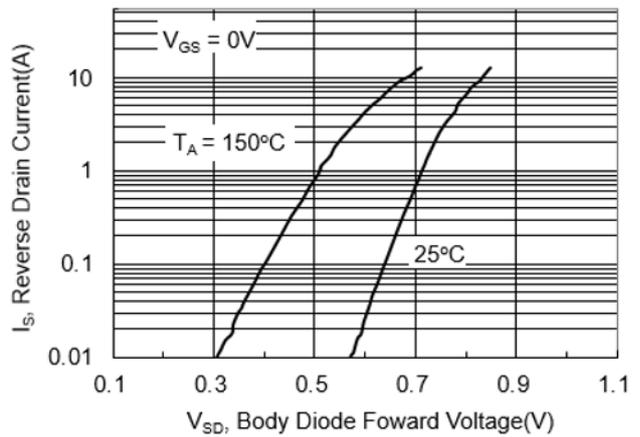


Figure 4. Body Diode Characteristics

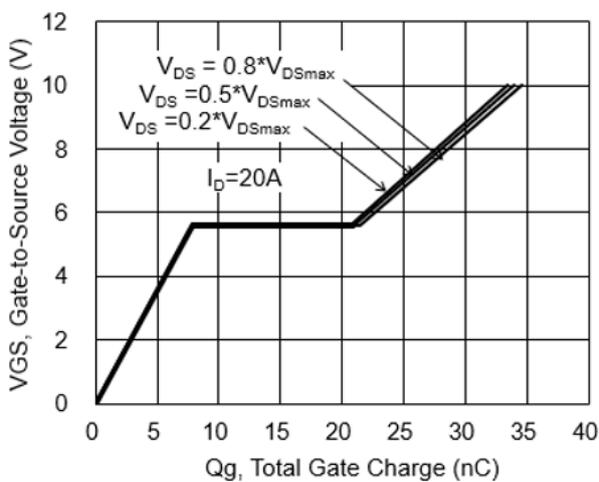


Figure 5. Gate Charge Characteristics

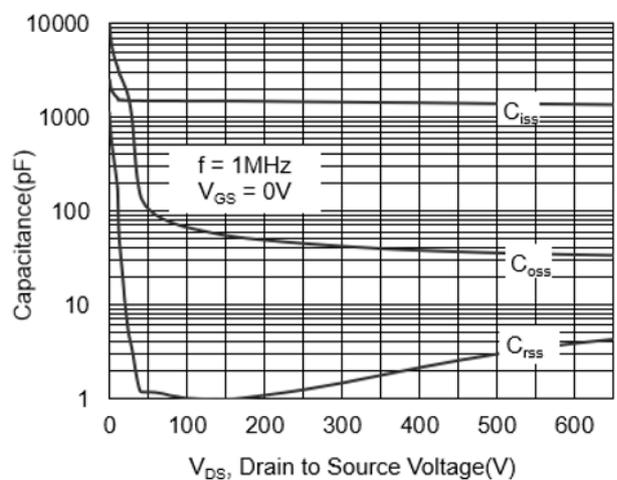


Figure 6. Capacitance Characteristic

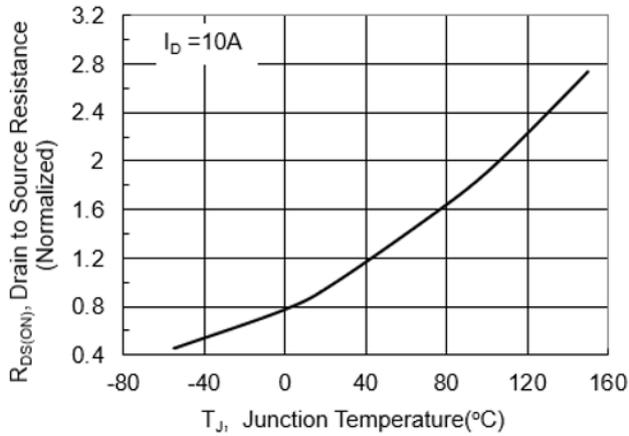


Figure 7. Threshold Voltage vs. Junction Temperature

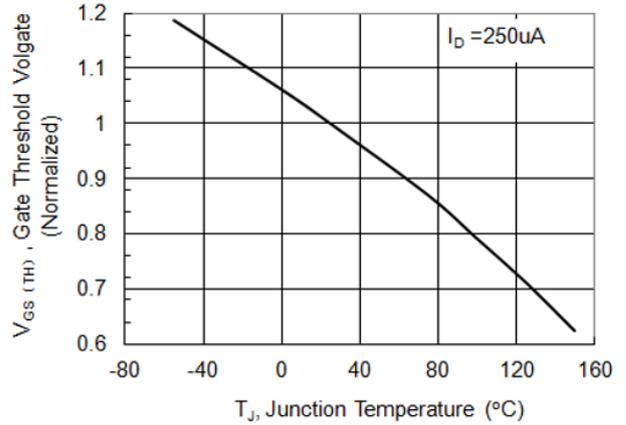


Figure 8. Normalized on Resistance vs. Junction Temperature

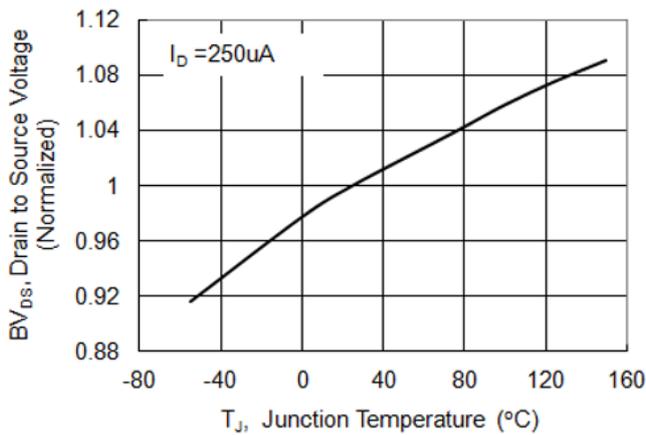


Figure 9. $V_{GS(TH)}$ vs junction temperature

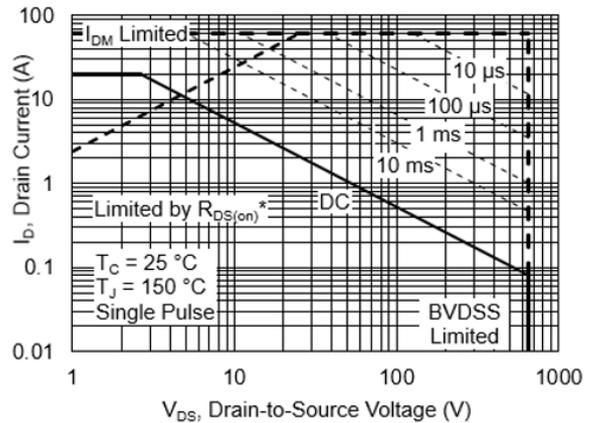


Figure 10. Safe operating area(TO-220F)

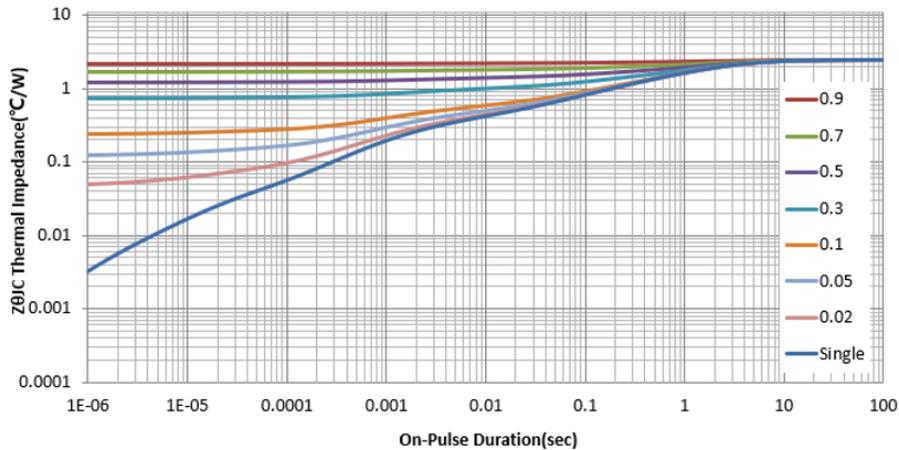


Figure 11. Transient thermal impedance (TO-220F)

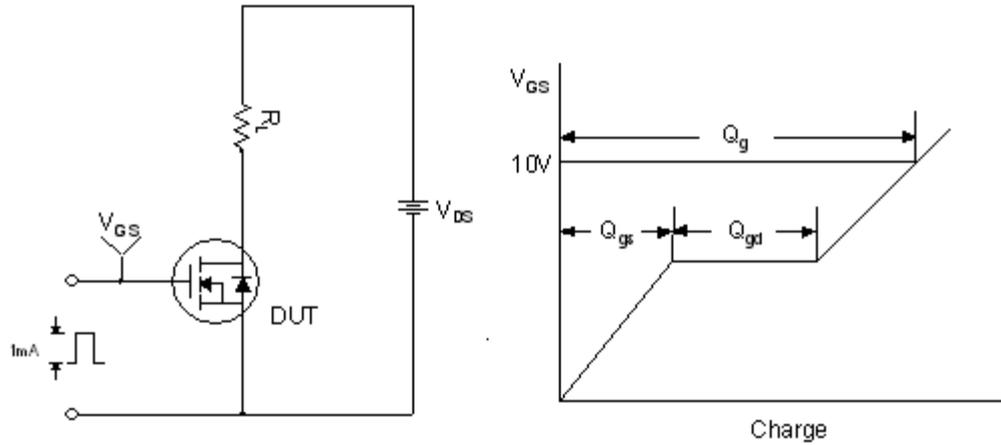


Figure 12. Gate Charge Test Circuit & Waveform

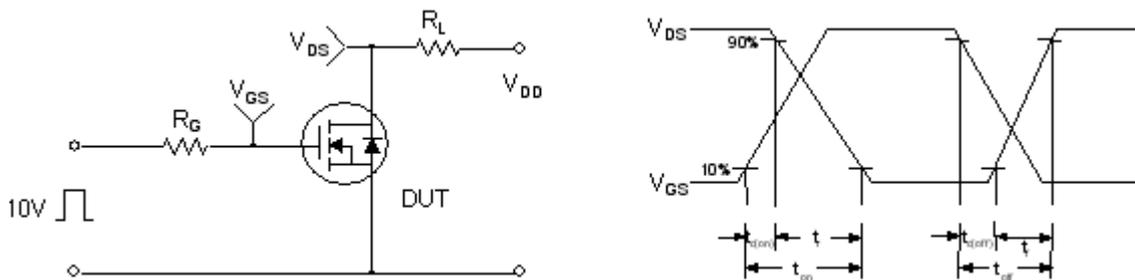


Figure 13. Resistive Switching Test Circuit & Waveforms

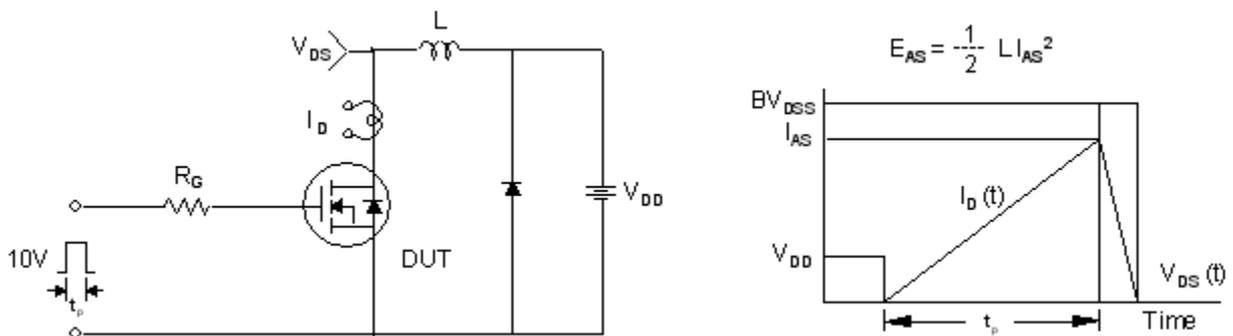


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

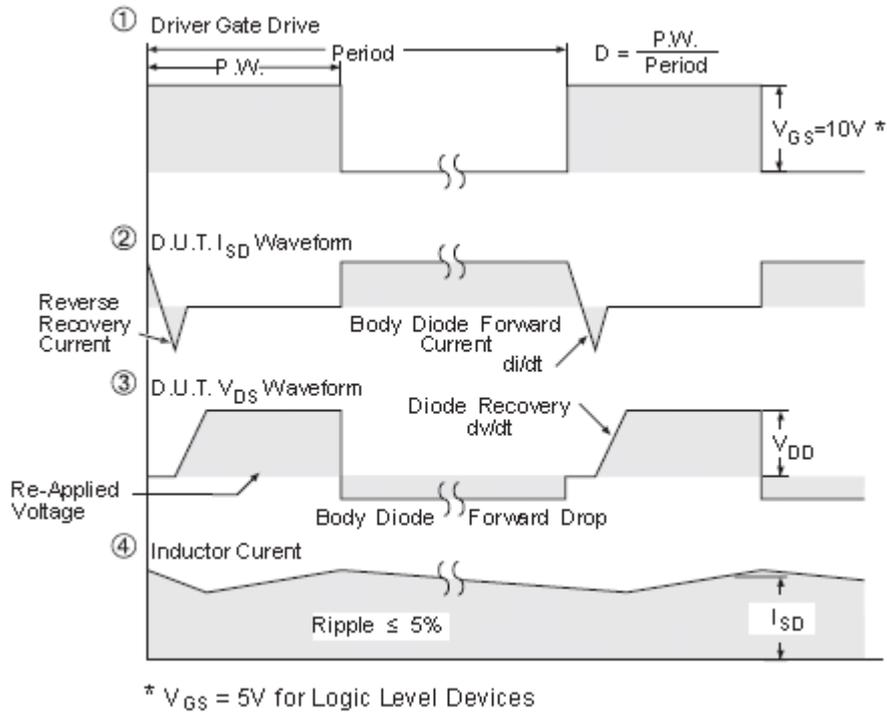
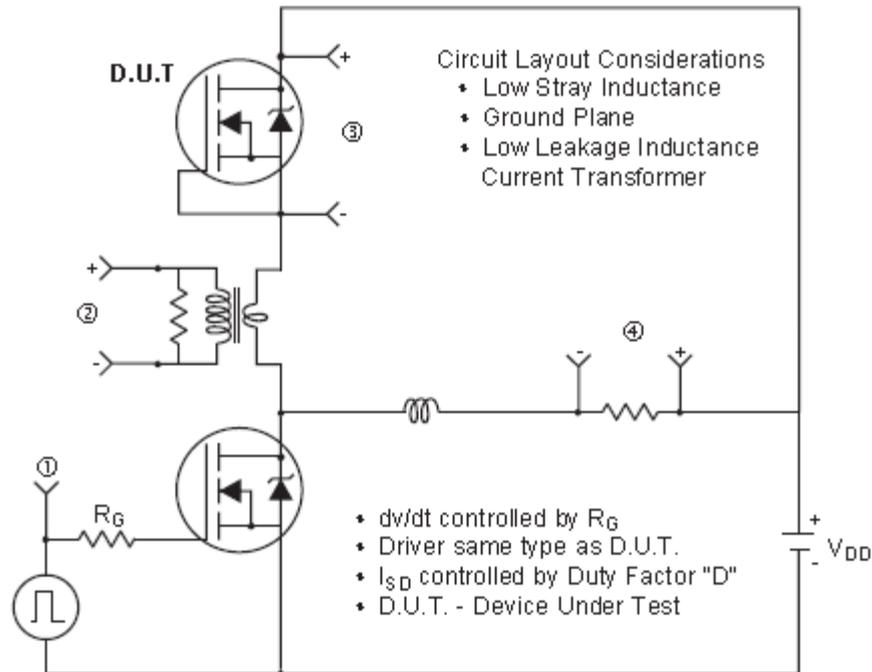
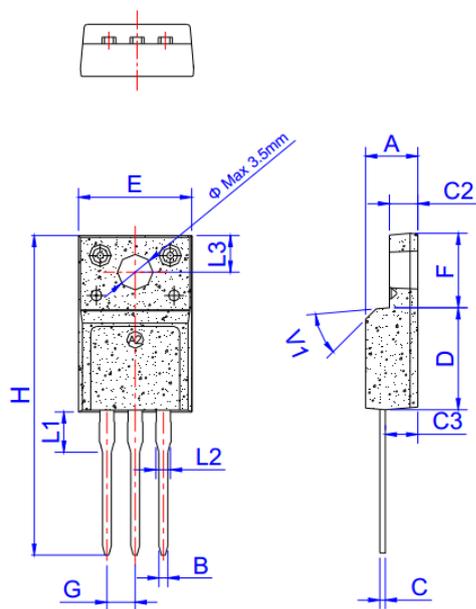


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)

Package Mechanical Data



TO-220F

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50		4.90	0.177		0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.60		3.00	0.102		0.118
D	8.80		9.30	0.346		0.366
E	9.80		10.4	0.386		0.410
F	6.40		6.80	0.252		0.268
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.63			0.143	
L2	1.14		1.70	0.045		0.067
L3		3.30			0.130	
V1		45°			45°	

WFF20N65SAH Product Description

Silicon N-Channel MOSFET



NOTE:

1. We strongly recommend customers check carefully on the trademark when buying our product, if there is any question, please don't be hesitate to contact us.
2. Please do not exceed the absolute maximum ratings of the device when circuit designing.
3. Winsemi Microelectronics Co., Ltd reserved the right to make changes in this specification sheet and is subject to change without prior notice.

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