
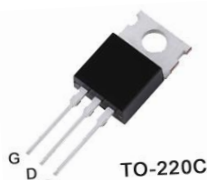


<p>Features</p> <ul style="list-style-type: none"> • 500V, 20A • $R_{DS(ON)} = 0.29\Omega$ (Max.) @ $V_{GS} = 10V, I_D = 10A$ • Fast switching • 100% avalanche tested • Improved dv/dt capability 	<p>Application</p> <ul style="list-style-type: none"> • Switch Mode Power Supply(SMPS) • Uninterruptible Power Supply (UPS) • Power Factor Correction(PFC)
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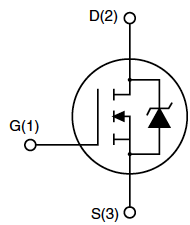
Package



TO-220F
WFF20N50MA



TO-220
WFP20N50MA



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

Symbol	Parameter	Max.		Units
		TO-220F	TO-220	
V_{DSS}	Drain-Source Voltage	500		V
V_{GSS}	Gate-Source Voltage	± 30		V
I_D	Continuous Drain Current $T_C = 25^\circ C$	20		A
I_{DM}	Pulsed Drain Current ^{note1}	80		A
E_{AS}	Single Pulsed Avalanche Energy ^{note2}	980		mJ
I_{AS}	Avalanche Current ^{note1}	14		A
E_{AR}	Repetitive Avalanche Energy ^{note1}	588		mJ
P_D	Power Dissipation $T_C = 25^\circ C$	98	208	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.27	0.6	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	40	$^\circ C/W$
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	$V_{GS} = 0V, I_D = 250\mu A$	500	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$	-	-	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	$V_{DS} = V_{GS}, I_D = 250\mu A$	3	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 10A$	-	0.26	0.29	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	-	2367	-	pF
C_{oss}	Output Capacitance		-	228	-	pF
C_{riss}	Reverse Transfer Capacitance		-	15	-	pF
Q_g	Total Gate Charge	$V_{DD} = 400V, I_D = 20A,$ $V_{GS} = 10V$	-	53	-	nC
Q_{gs}	Gate-Source Charge		-	10	-	nC
Q_{gd}	Gate-Drain Charge		-	12	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250V, I_D = 20A,$ $R_G = 25\Omega$	-	51	-	ns
t_r	Turn-On Rise Time		-	36	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	232	-	ns
t_f	Turn-Off Fall Time		-	61	-	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		-	-	80	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_{SD} = 10A$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 20A,$ $di/dt = 100A/\mu s$	-	497	-	ns
Q_{rr}	Reverse Recovery Charge		-	4	-	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10mH, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse width $\leq 325\mu s$; duty cycle $\leq 1\%$.

Typical Performance Characteristics

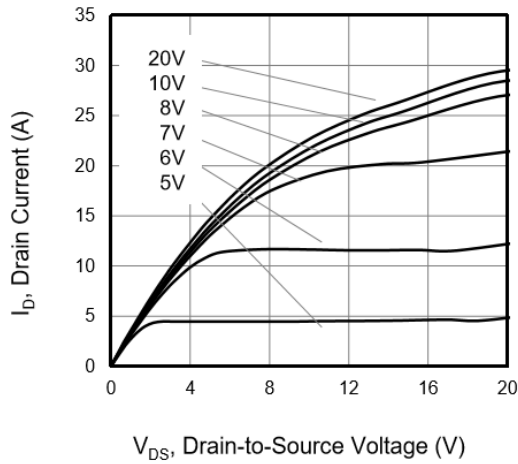


Figure 1. Output Characteristics

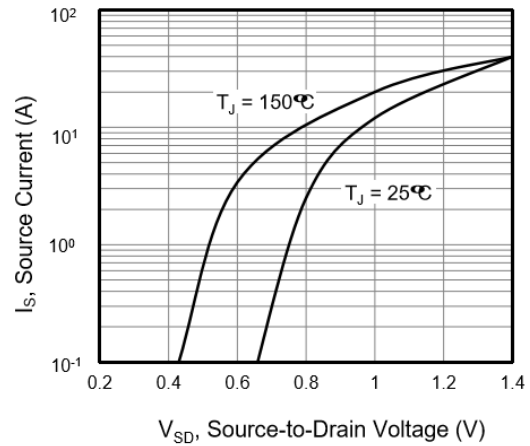


Figure 2. Body Diode Forward Voltage

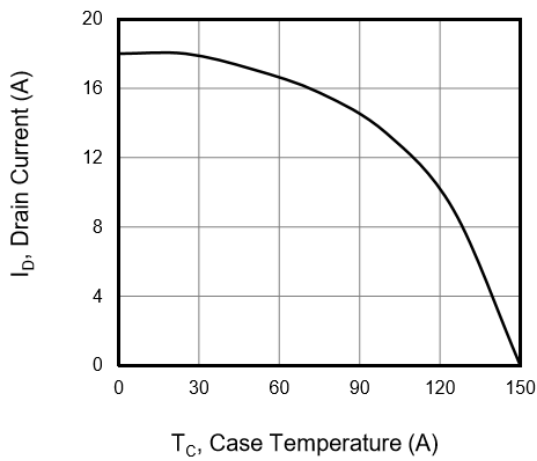


Figure 3. Maximum Continuous Drain Current Vs. Case Temperature

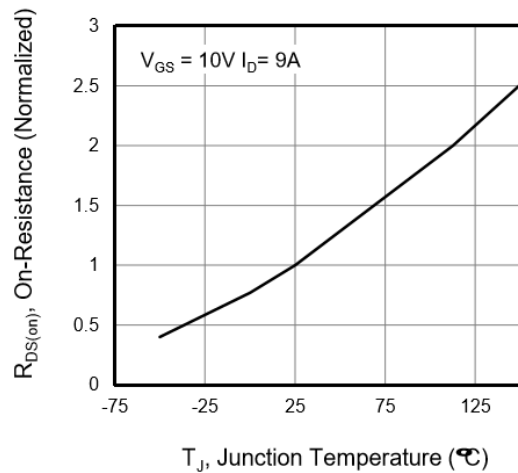


Figure 4. Normalized On Resistance vs. Junction Temperature

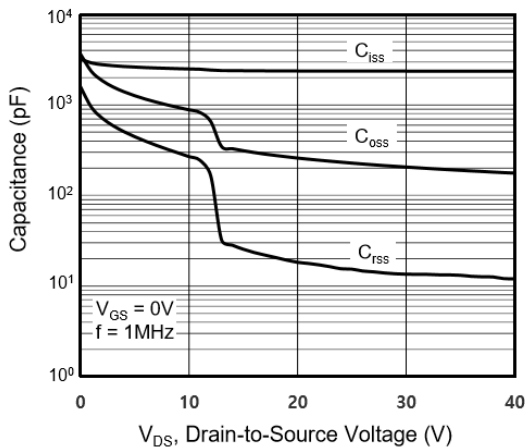


Figure 5. Capacitance Characteristics

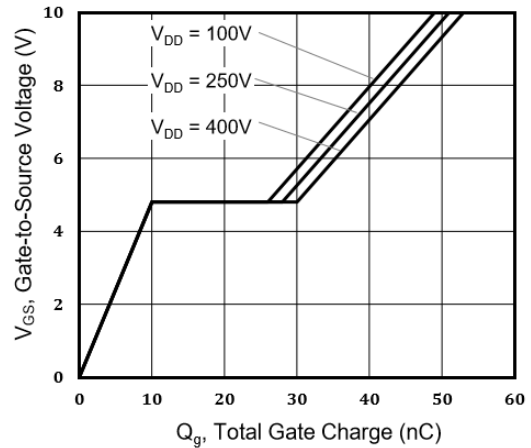


Figure 6. Gate Charge Characteristics

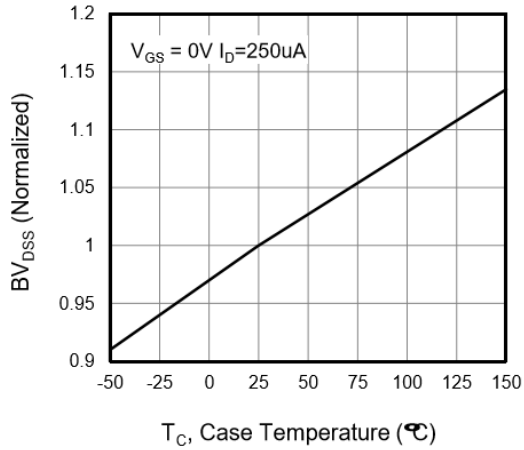


Figure 7. Normalized Breakdown Voltage vs. Junction Temperature

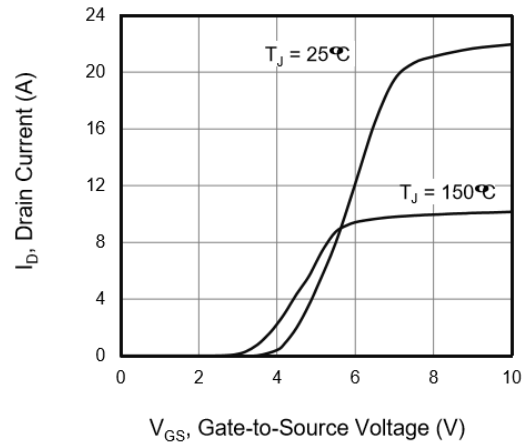


Figure 8. Transfer Characteristics

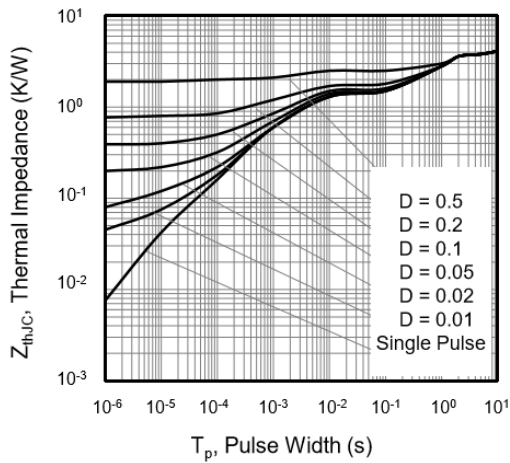


Figure 9. Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-220F)

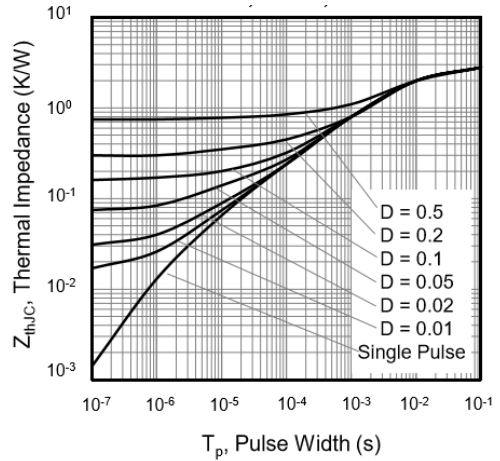


Figure 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-220)

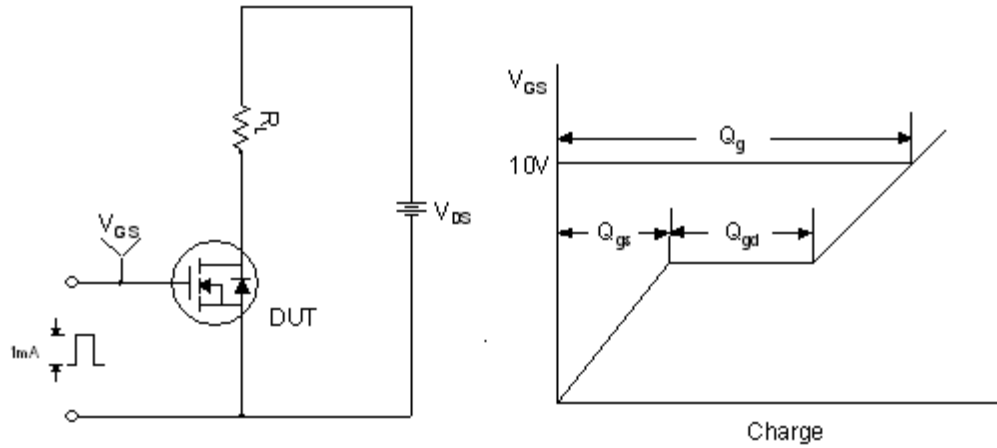


Figure 11. Gate Charge Test Circuit & Waveform

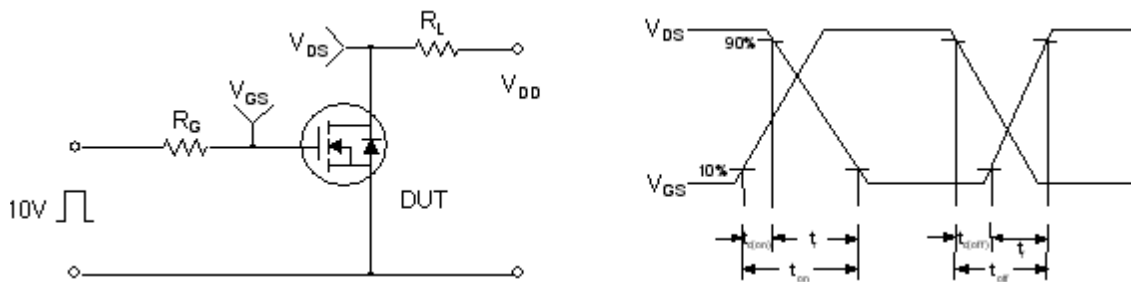


Figure 12. Resistive Switching Test Circuit & Waveforms

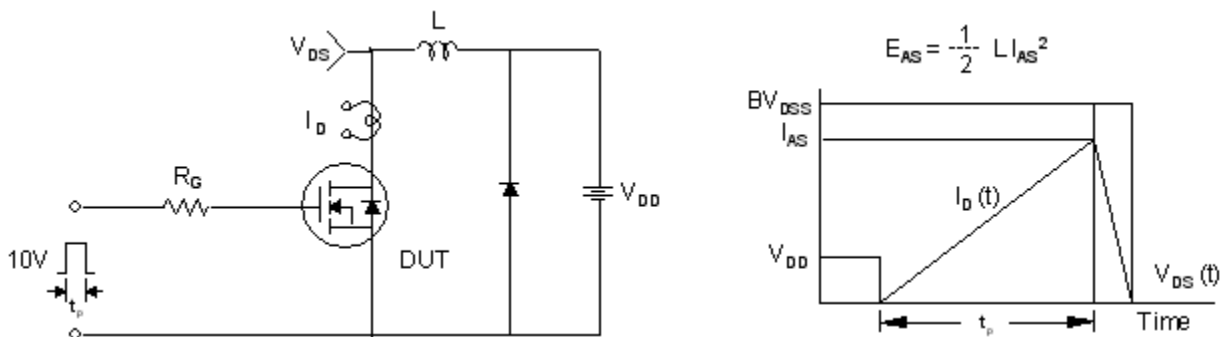


Figure 13. Unclamped Inductive Switching Test Circuit & Waveforms

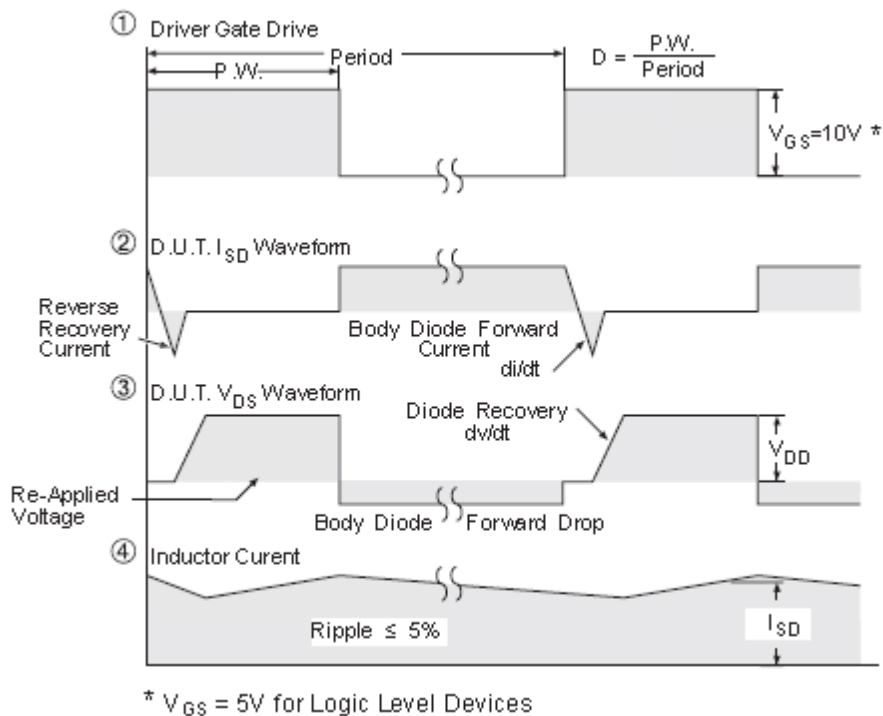
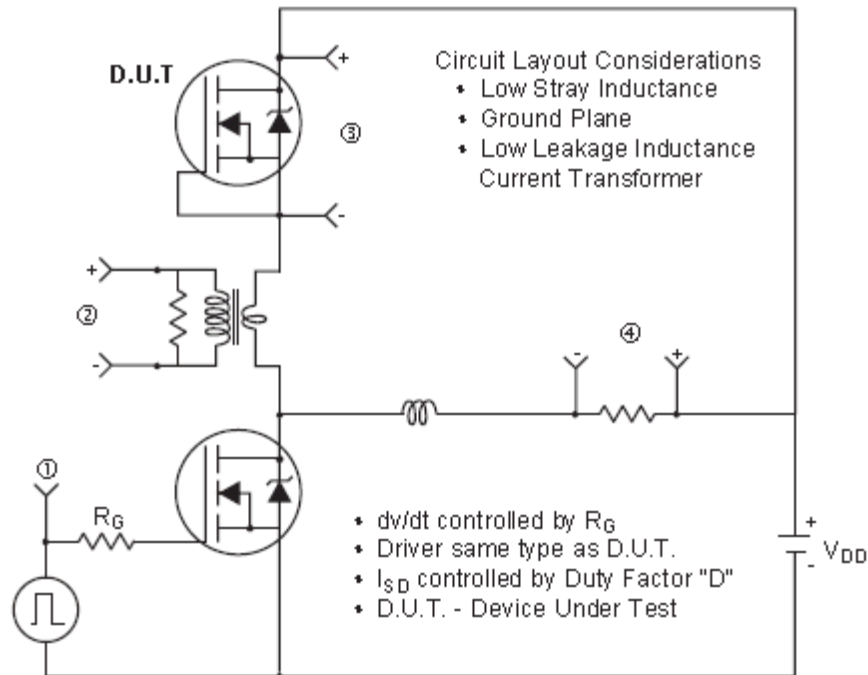
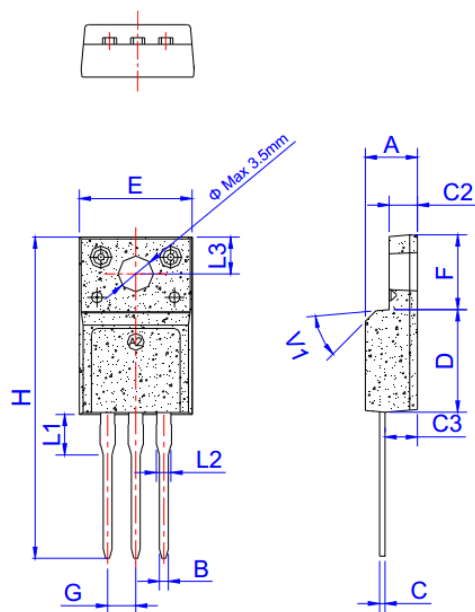


Figure 14. Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)

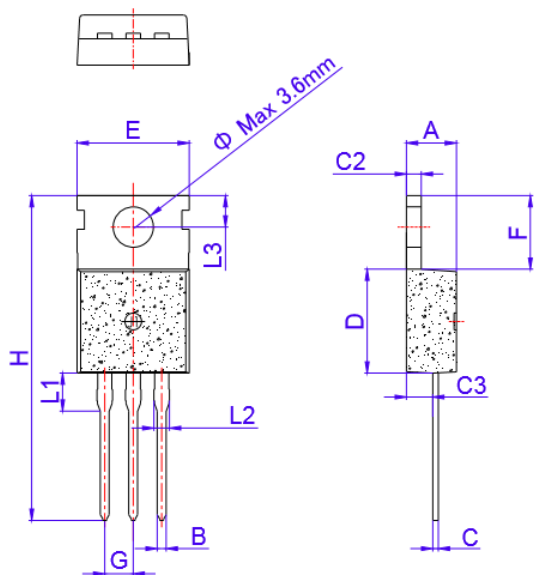
Package Mechanical Data



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°	

Package Mechanical Data



TO-220C

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
B	0.70		0.90	0.028		0.035
C	0.45		0.60	0.018		0.024
C2	1.23		1.32	0.048		0.052
C3	2.20		2.60	0.087		0.102
D	8.90		9.90	0.350		0.390
E	9.90		10.3	0.390		0.406
F	6.30		6.90	0.248		0.272
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.39			0.133	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
Φ		3.6			0.142	

WFF(P)20N50MA 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.

CONTACT:

Winsemi Microelectronics Co., Ltd.

ADD: Room 1002, East, Phase 2, HighTech Plaza, Tian-An Cyber Park, Che gong miao, FuTian, Shenzhen, P.R. China.

Post Code : 518040

Tel : +86-755-8250 6288

FAX : +86-755-8250 6299

Web Site : www.winsemi.com