



Description

WENLAI Power MOSFET is fabricated using advanced super junction technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

Features

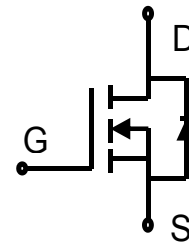
- ◆ Ultra low $R_{DS(on)}$
- ◆ Ultra low gate charge (typ. $Q_g = 40nC$)
- ◆ 100% UIS tested
- ◆ RoHS compliant

Applications

- ◆ Power factor correction (PFC).
- ◆ Switched mode power supplies (SMPS).
- ◆ Uninterruptible power supply (UPS).

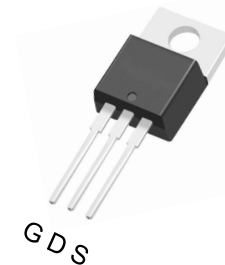
Product Summary

$V_{DS} @ T_{j,max}$	600V
$R_{DS(on),max}$	0.14Ω
I_{DM}	30A
$Q_{g,typ}$	40 nC



N-Channel MOSFET

Pin Configuration



TO-220F

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	550	V
Continuous drain current ($T_C = 25^{\circ}C$)	I_D	10	A
		6.3	A
Pulsed drain current ²⁾	I_{DM}	30	A
Gate-Source voltage	V_{GSS}	± 30	V
Avalanche energy, single pulse ³⁾	E_{AS}	600	mJ
Power Dissipation	P_D	34	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^{\circ}C$
Continuous diode forward current	I_S	10	A
Diode pulse current	$I_{S,pulse}$	30	A

Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.7	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient ⁴⁾	$R_{\theta JA}$	60	$^{\circ}C/W$

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Tube
WLP140R50F	TO-220F	WLP140R50F	50



Electrical Characteristics T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0 V, I _D =0.25 mA	550	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =0.25mA	2.5	3.5	5.0	V
Drain cut-off current	I _{DSS}	V _{DS} =550 V, V _{GS} =0 V, T _J = 25°C	-	-	5	μA
Gate leakage current, Forward	I _{GSSF}	V _{GS} =30 V, V _{DS} =0 V	-	-	100	nA
Gate leakage current, Reverse	I _{GSSR}	V _{GS} =-30 V, V _{DS} =0 V	-	-	-100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =11.5 A T _J = 25°C T _J = 150°C	- - -	0.11 0.26	0.14 -	Ω
Gate resistance	R _G	f=1 MHz, open drain	-	5.3	-	Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 100 V, V _{GS} = 0 V, f = 250kHz	-	1703	-	pF
Output capacitance	C _{oss}		-	78	-	
Reverse transfer capacitance	C _{rss}		-	2.8	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 400V, I _D = 11.5A R _G = 5Ω, V _{GS} =15V	-	70	-	ns
Rise time	t _r		-	14	-	
Turn-off delay time	t _{d(off)}		-	72	-	
Fall time	t _f		-	7.7	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =440 V, I _D =11.5A, V _{GS} =0 to 10 V	-	9	-	nC
Gate to drain charge	Q _{gd}		-	16.5	-	
Gate charge total	Q _g		-	40	-	
Gate plateau voltage	V _{plateau}		-	5.7	-	V
Reverse diode characteristics						
Diode forward voltage	V _{SD}	V _{GS} =0 V, I _F =23A	-	-	1.1	V
Reverse recovery time	t _{rr}	V _R =400 V, I _F =11.5A, dI _F /dt=100 A/μs	-	166	-	ns
Reverse recovery charge	Q _{rr}		-	1.17	-	μC
Peak reverse recovery current	I _{rrm}		-	14.1	-	A

Notes:

1. The value reference TO-247 package.
2. Limited by maximum junction temperature, maximum duty cycle is 0.75.
3. I_{AS} = 5A, L=48mH, V_{DD} = 60V, Starting T_J= 25°C.
4. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.



Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

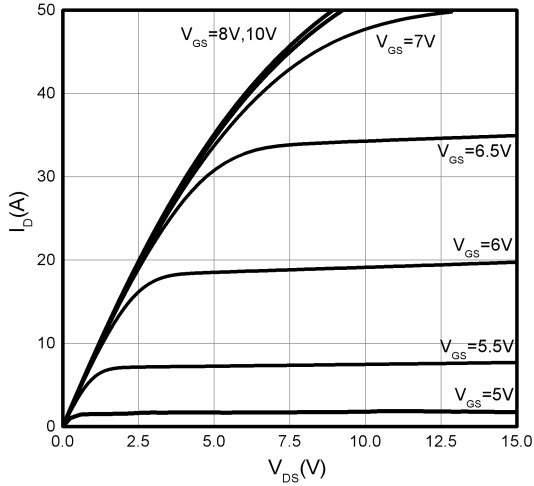


Figure 2. Transfer Characteristics

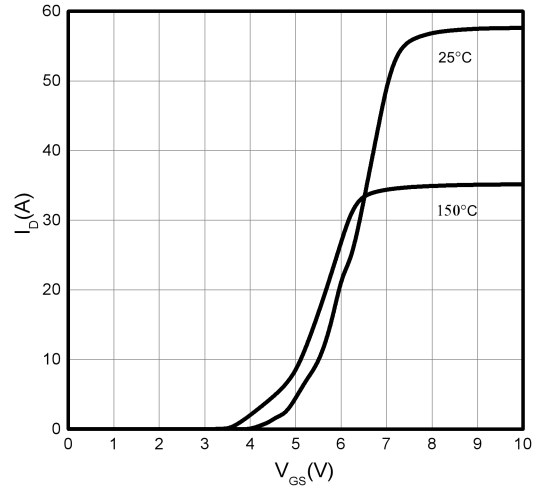


Figure 3. On-Resistance vs. Drain Current

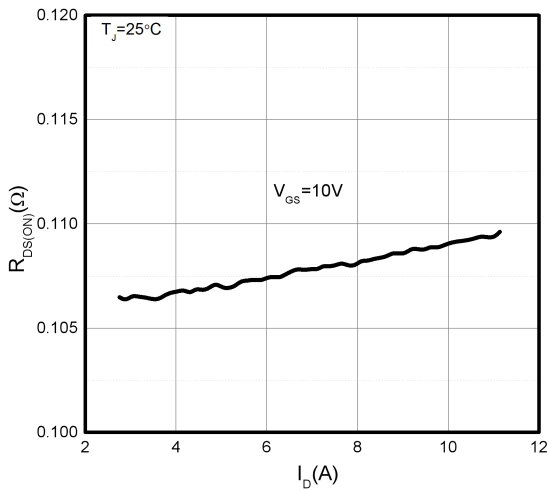


Figure 4. On-Resistance vs. Temperature

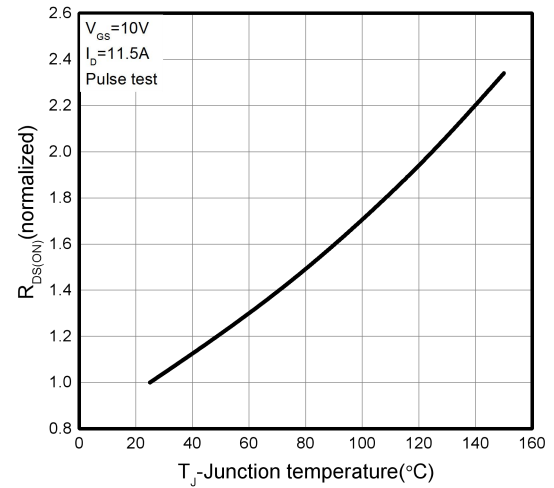


Figure 5. Breakdown Voltage vs. Temperature

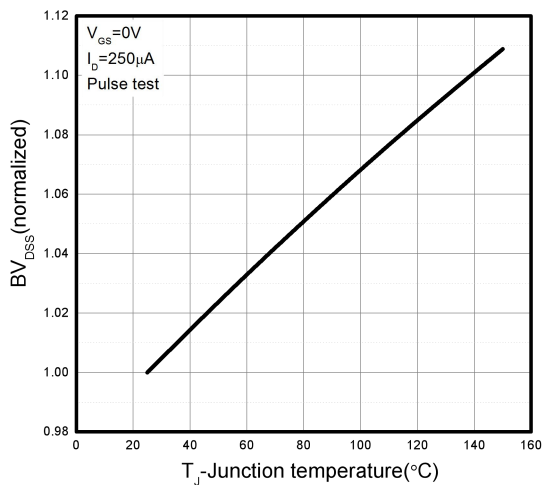


Figure 6. Threshold Voltage vs. Temperature

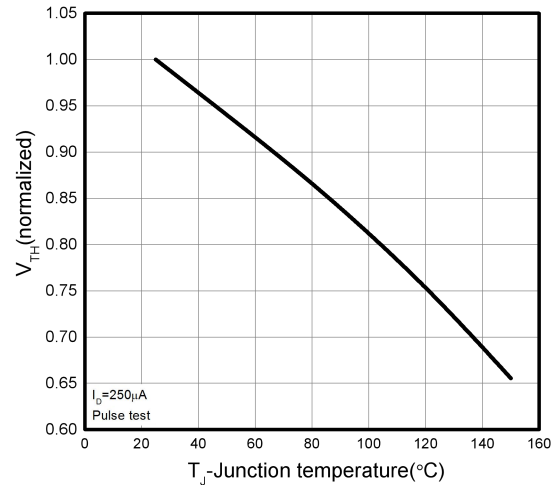




Figure 7. Body-Diode Characteristics

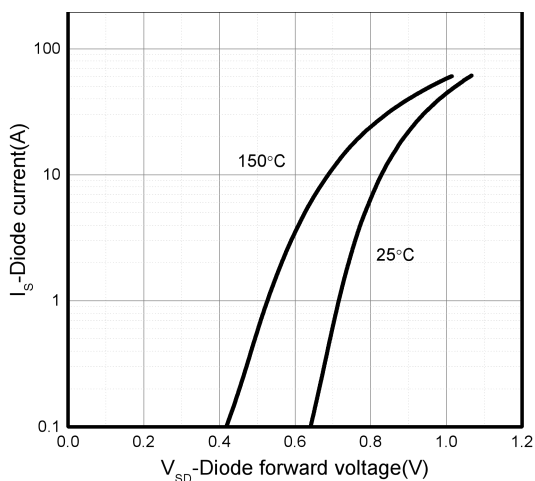


Figure 8. Capacitance Characteristics

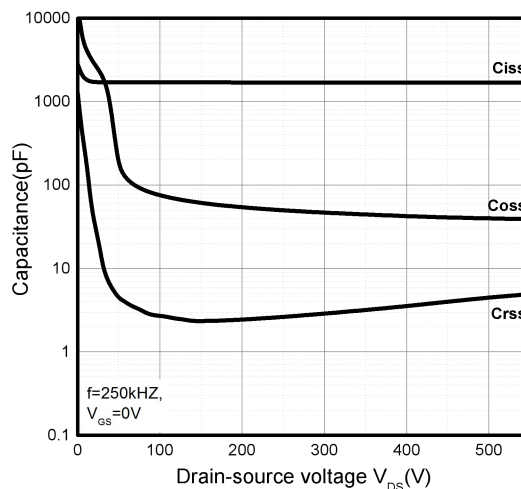


Figure 9. Gate Charge Characteristics

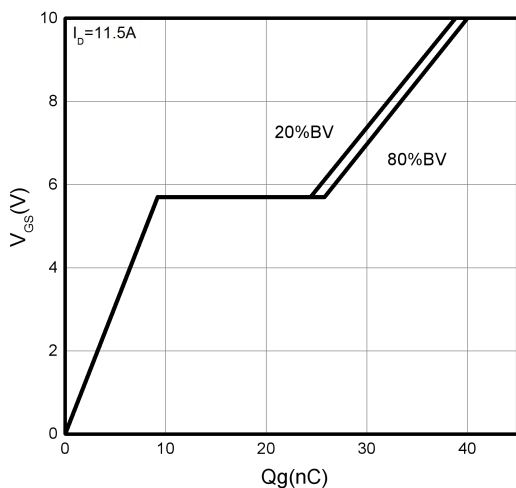


Figure 10. Drain Current Derating

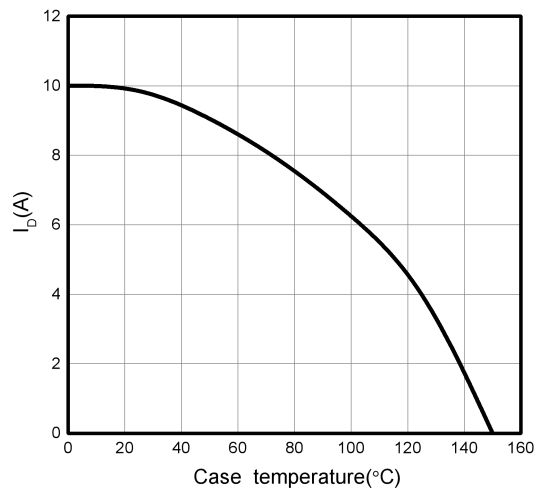


Figure 11. Power Dissipation vs. Temperature

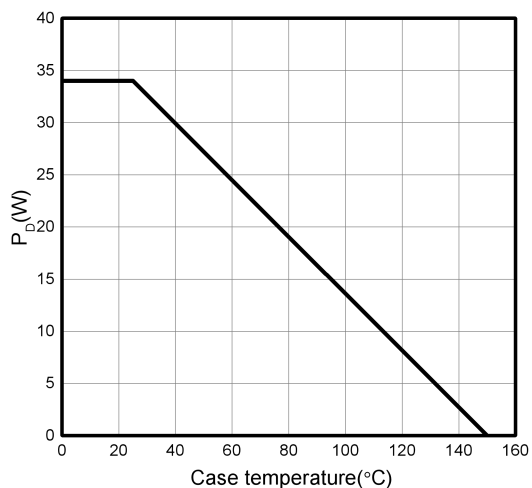


Figure 12: Safe Operating Area

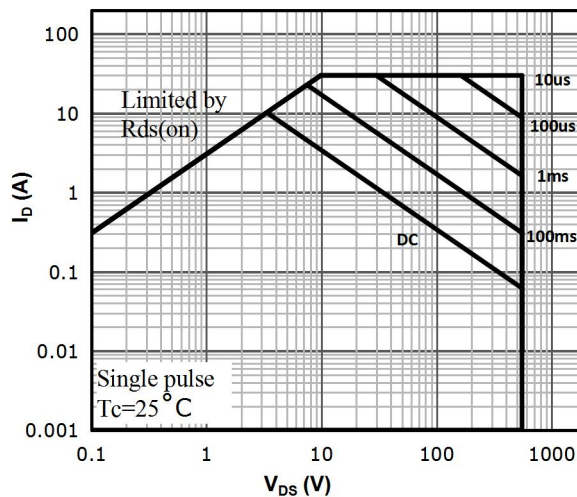
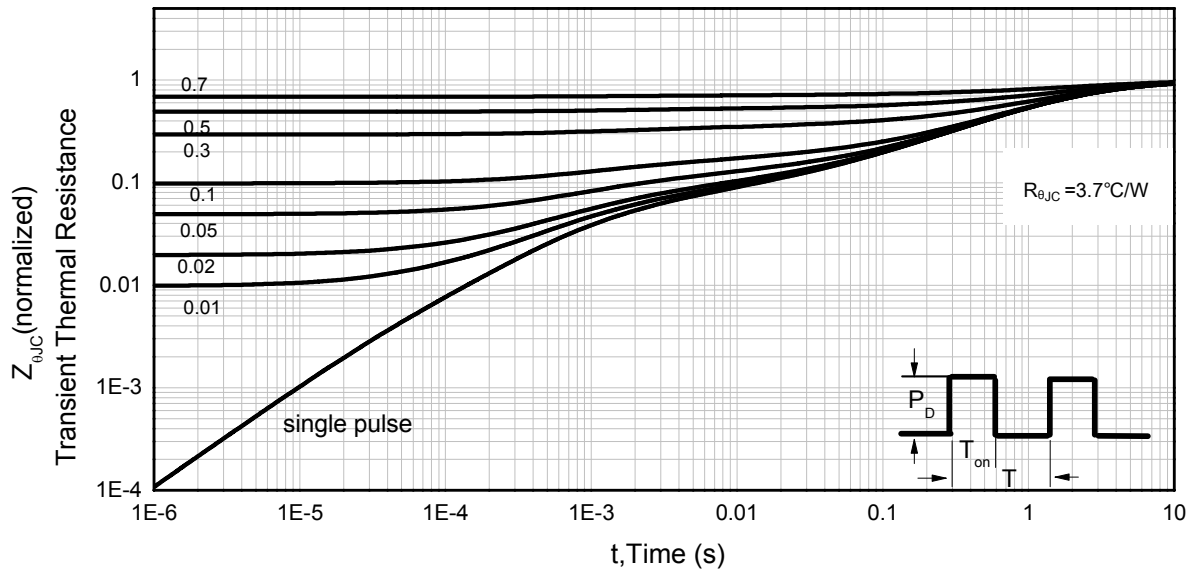




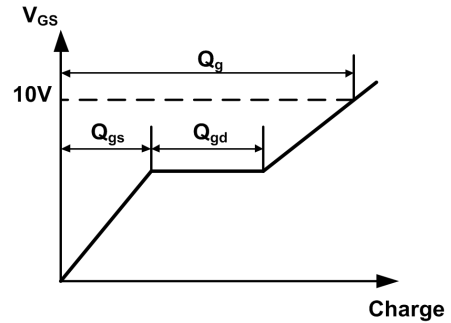
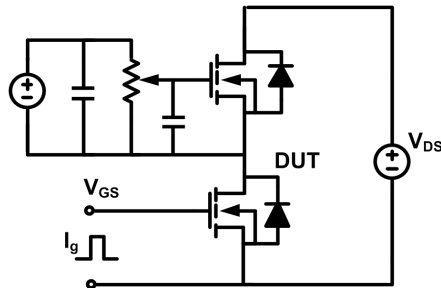
Figure 13. Normalized Maximum Transient Thermal Impedance (RthJC)



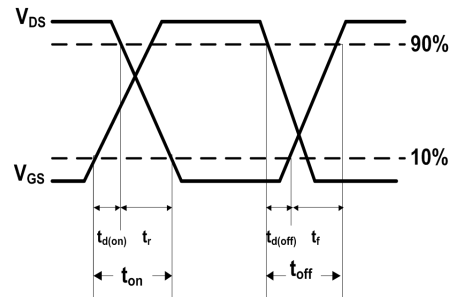
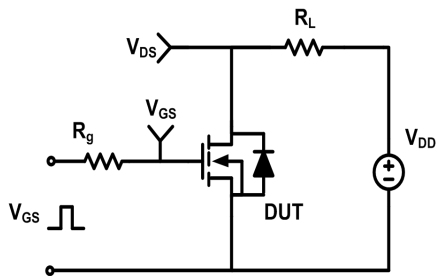


Test Circuit & Waveforms

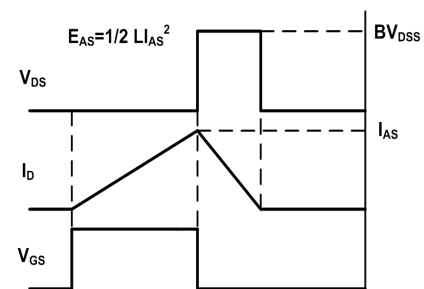
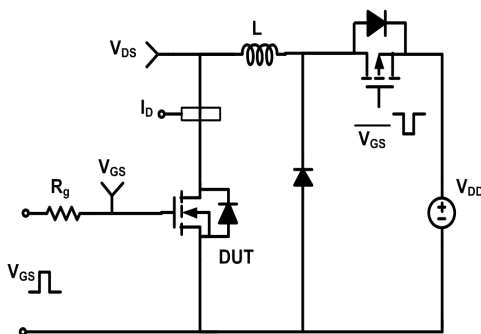
Gate Charge Test Circuit & Waveform



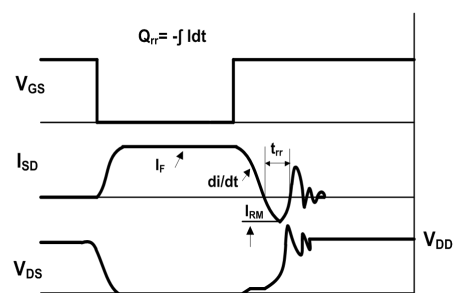
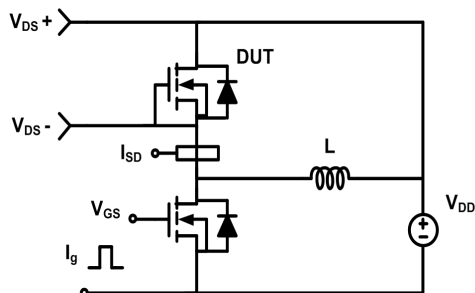
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform

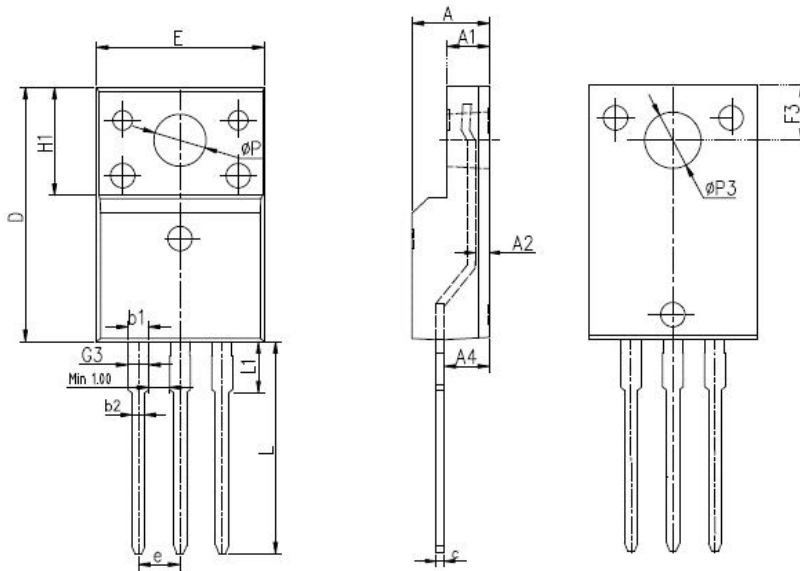


Diode Recovery Test Circuit & Waveform





Mechanical Dimensions for TO-220F



DIMENSIONS IN MILLIMETERS		
SYMBOL	MIN	MAX
A	4.4	4.9
A1	2.34	2.74
A2	0.3	0.7
A4	2.5	2.96
c	0.4	0.7
D	15.57	16.4
E	9.96	10.4
H1	6.48	6.95
e	2.54BSC	
L	12.68	14.2
L1	2.88	3.6
ΦP	3	3.38
ΦP3	3.15	3.65
F3	3.15	3.45
G3	1.15	1.58
b1	1.18	1.43
b2	0.7	1



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