



WANSEMI
万芯半导体

WP4N60FA

Enhancement Mode N-Channel Power MOSFET

TO-220F/NMOS/600V/ ± 30 V/3V/4A/1.82 Ω

Rev0.5

600V, 1.82Ω, 4A, N-Channel MOSFET

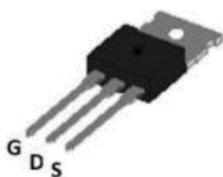
1.Features

- ◆ New technology for high voltage device
- ◆ Low on-resistance and low conduction losses
- ◆ Ultra Low Gate Charge cause lower driving requirements

V _{DS} Typ.	R _{DS(on)} Typ.	I _D Max.
600V	1.82Ω @ 10V	4A

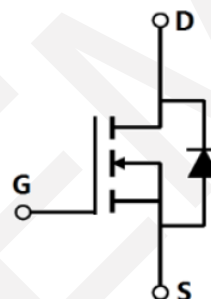
2.Applications

- ◆ Power factor correction
- ◆ Switched mode power supplies
- ◆ Uninterruptible Power Supply



Pin Description

TO-220F



Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Tube	PCS/CTN.
WP4N60FA	WP4N60	TO-220F	50	5,000

4.Absolute Max Ratings at Ta=25°C (Note1)

Parameter	Symbol	Maximum	Units
Drain to Source Voltage	V _{DSS}	600	V
Gate to Source Voltage	V _{GSS}	±30	V
Drain Current-Continuous	I _D	4	A
Drain Current (Pulse)	I _{DM}	16	A
Single Pulsed Avalanche Energy	E _{AS}	210	mJ
Maximum Power Dissipation	P _D	28.4	W
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55 to +160	°C

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

5. Thermal Resistance Ratings (Note 2)

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.4	$^{\circ}C/W$

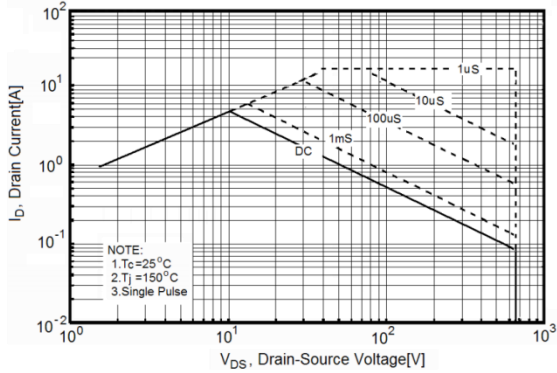
Note 2: When mounted on 1 inch square copper board $t \leq 10$ sec The value in any given application depends on the user's specific board design.

6. Electrical Characteristics at $T_a=25^{\circ}C$ (Note 3)

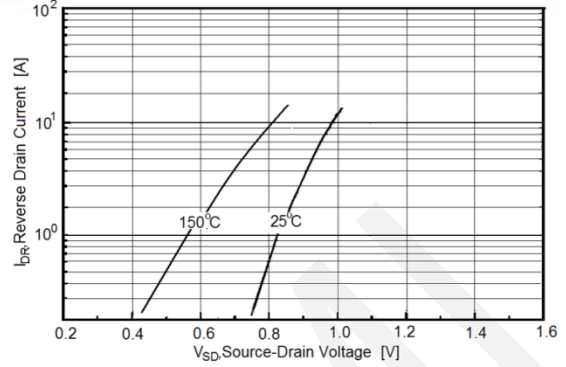
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	600	640	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 2A, V_{GS} = 10V$	-	1.82	2.2	Ω
Input Capacitance	C_{iss}	$V_{GS}=0V,$	-	304	-	pF
Output Capacitance	C_{oss}	$V_{DS}=50V,$	-	18	-	pF
Reverse Transfer Capacitance	C_{rss}	Frequency=1.0MHz	-	0.6	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 380V, V_{GS} = 10V, R_{GEN} = 5\Omega, I_D = 2.5A$	-	8	-	ns
Turn-ON Rise Time	t_r		-	4	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	52	-	ns
Turn-ON Fall Time	t_f		-	9	-	ns
Total Gate Charge	Q_g		$V_{DS} = 480V,$	-	8.8	-
Gate-Source Charge	Q_{gs}	$V_{GS} = 10V,$	-	2.3	-	nC
Gate-Drain Charge	Q_{gd}	$I_D = 4A$	-	4	-	nC
Diode Forward Voltage	V_{SD}	$I_S = 4A, V_{GS} = 0V$	0.5	0.8	1.1	V
Maximum Continuous Drain to Source Diode Forward Current	I_S	-	-	-	4	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}	-	-	-	16	A
Body Diode Reverse Recovery Time	t_{rr}	$I_F=2A,$ $di/dt=100A/\mu s$	-	200	-	ns
Body Diode Reverse Recovery Chrg	Q_{rr}		-	0.6	-	nC

Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

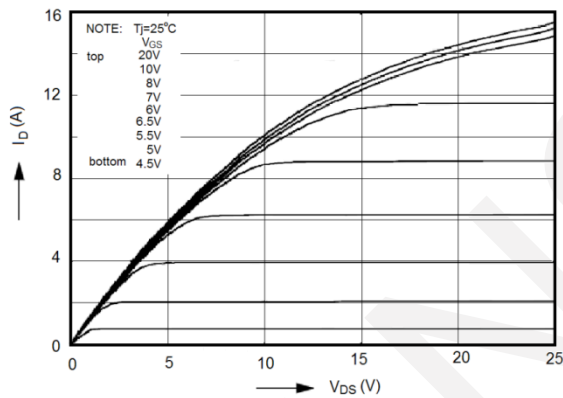
7. Typical electrical and thermal characteristics



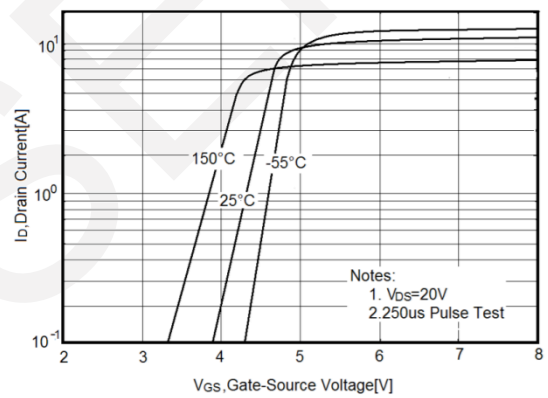
Safe operating area



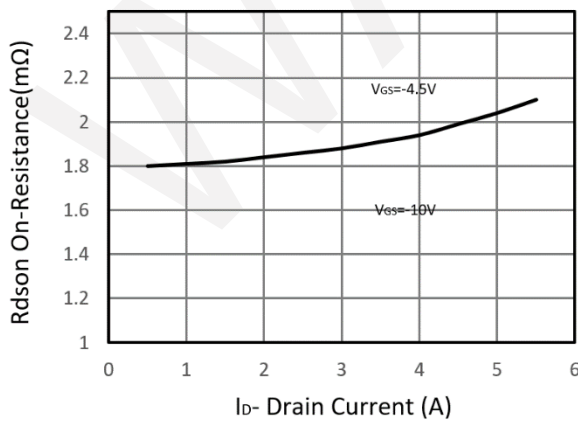
Source-Drain Diode Forward Voltage



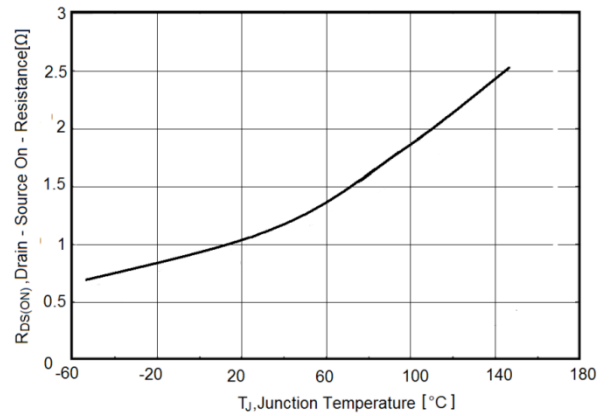
Output Characteristics



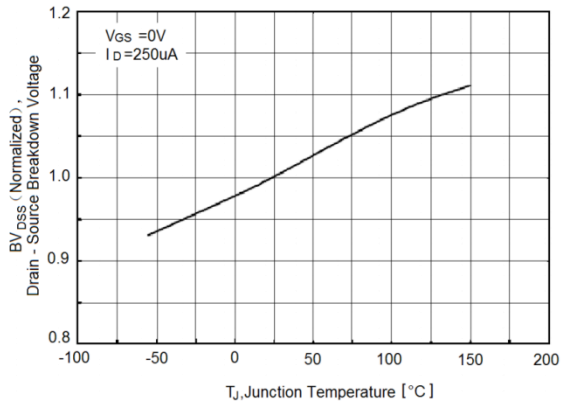
Typical Transfer Characteristics



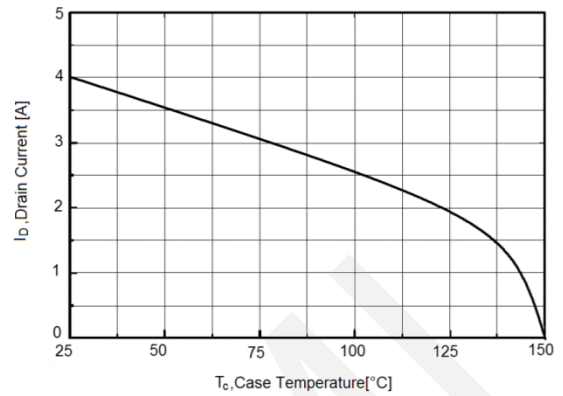
Static drain-source on resistance



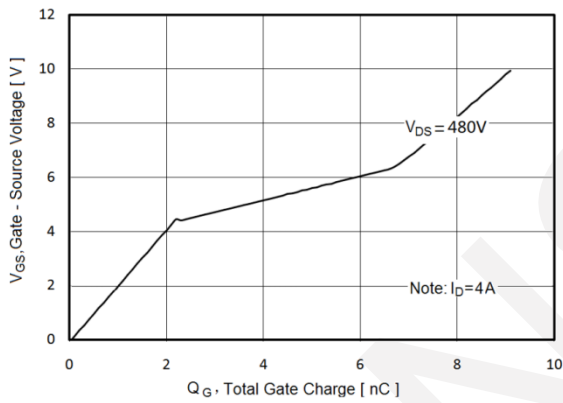
$R_{DS(on)}$ vs Junction Temperature



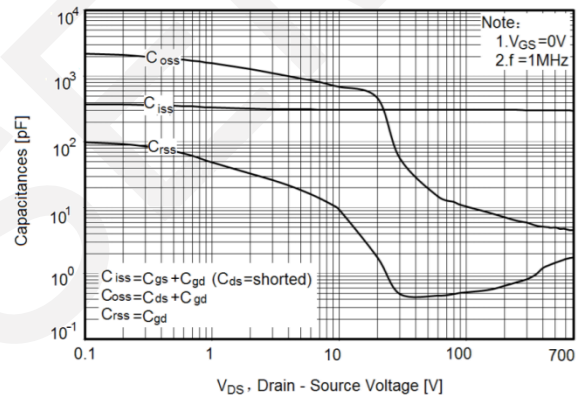
BV_{DSS} vs Junction Temperature



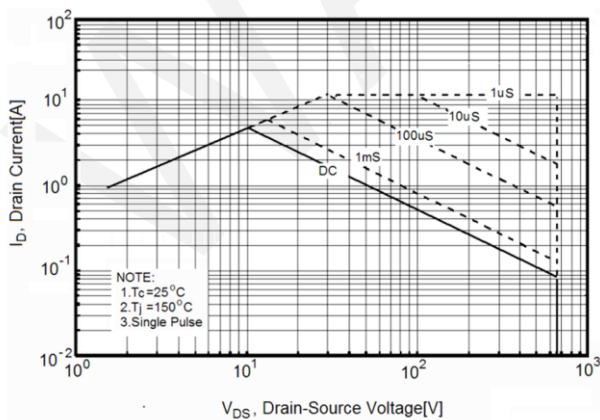
Maximum Id vs Junction Temperature



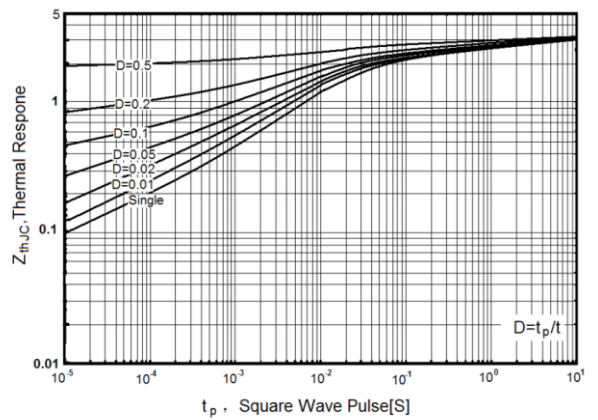
Gate charge waveforms



Capacitance



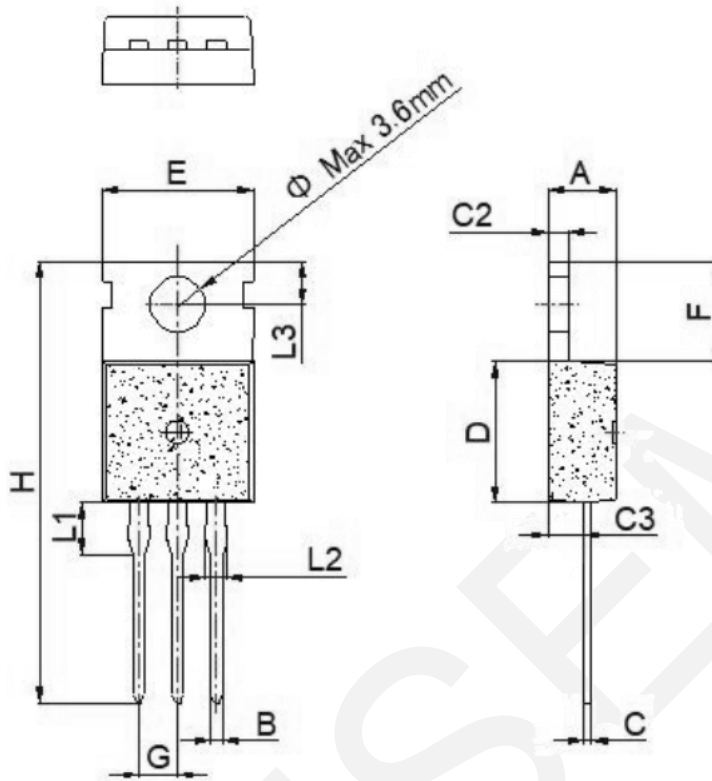
Safe operating area



Transient Thermal Impedance



8.Package Dimensions



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	

9. Important Notice

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