AWFR220N65S

N-Channel Super Junction Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
650V	220mΩ@10V	13A

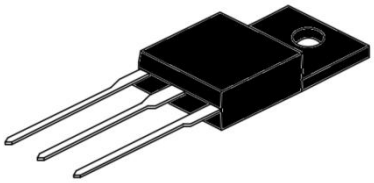
Feature

- Low FOM $R_{DS(ON)}\times Q_G$
- Extremely low losses due to very low E_{on} and E_{off}
- Excellent stability and uniformity

Application

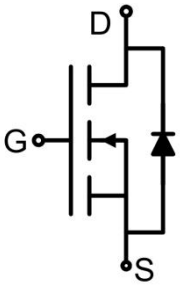
- SMPS
- Adapter
- LED Lighting
- EV Charger
- Telecom Power
- Solar Inverter

Package

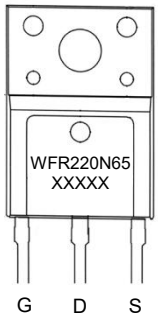


ITO-220ABW

Circuit diagram



Marking



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Absolute maximum ratings (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage (AC,f >1Hz)	V_{GS}	±30	V
Gate-Source Voltage (Static)	V_{GS}	±20	V
Continuous Drain Current[1] (T_C =25℃)	I_D	13	A
Continuous Drain Current[1] (T_C =100℃)	I_D(100℃)	8	A
Pulsed Drain Current[2] (T_C =25℃)	I_{DM}	50	A
Power Dissipation (T_C =25℃)	P_D	40	W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	3.1	℃/W
Single pulse avalanche energy[3]	E_{AS}	400	mJ
Avalanche current[3]	I_{AS}	3.9	A
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =1mA	650			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =650V,V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±30V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	3.0	3.5	4.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =8A		200	220	mΩ
		V_{GS} =10V, I_D =8A,T_J =150℃		500		
Dynamic characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =50V, V_{GS} =0V, f =100KHz		680		pF
Output Capacitance	C_{oss}			100		
Reverse Transfer Capacitance	C_{rss}			2.5		
Gate Resistance	R_g	f =1MHz, open drain		5		Ω
Total Gate Charge	Q_g	V_{DD}=400V, V_{GS} =0 to 10V, I_D =8A		22		nC
Gate-Source Charge	Q_{gs}			5.8		
Gate-Drain Charge	Q_{gd}			8		
Gate Plateau Voltage	V_{gp}			5.5		V
Turn-on delay time	$t_{d(on)}$	V_{DD}=400V, V_{GS}=15V, I_D=8A, R_G=10Ω		25		nS
Turn-on rise time	t_r			80		
Turn-off delay time	$t_{d(off)}$			70		
Turn-off fall time	t_f			50		
Source-Drain Diode characteristics						
Diode Forward Current	I_S	T_C =25℃			13	A
Diode Forward Pulse Current[2]	I_{SM}				50	
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S=13A			1.3	V
Reverse Recovery Time	t_{rr}	I_F =8A,V_R=400V diF/dt =100A/μs		350		nS
Reverse Recovery Charge	Q_{rr}			3.5		μC
Peak Reverse Recovery Current	I_{rrm}			18		A

Notes:

1) The max collector current rating is package limited.

2) Repetitive Rating: Pulse width limited by maximum junction temperature

3) Test Condition: I_D=3.9A,V_{DD}=50V.

4) Guaranteed by design, not subject to production testing.

Typical Characteristics

Fig.1 Typical Output characteristics (25°C)

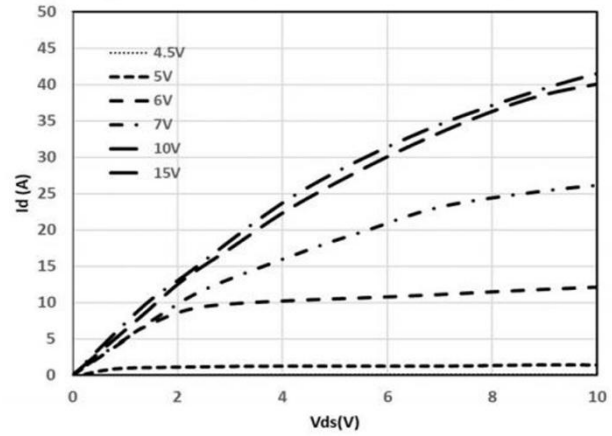


Fig.2 Transfer characteristics

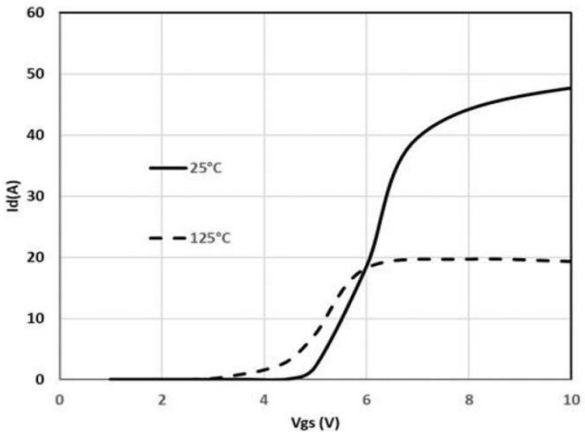


Fig.3 Safe Operating Area

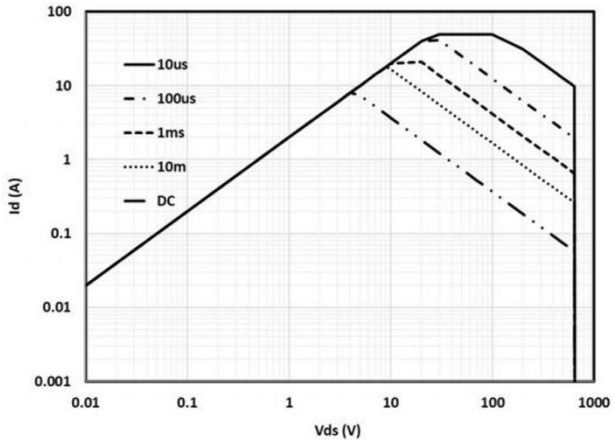


Fig.4 Power dissipation

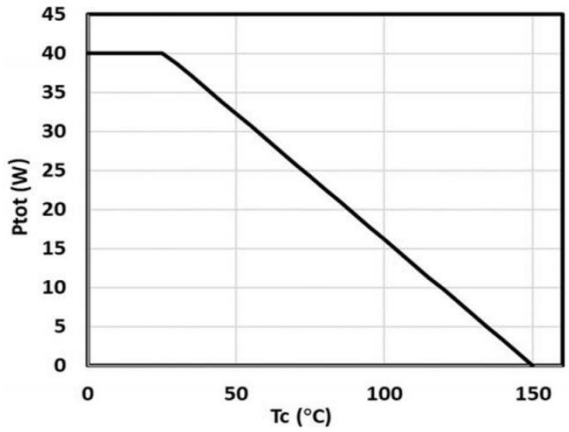


Fig.5 Gate charge

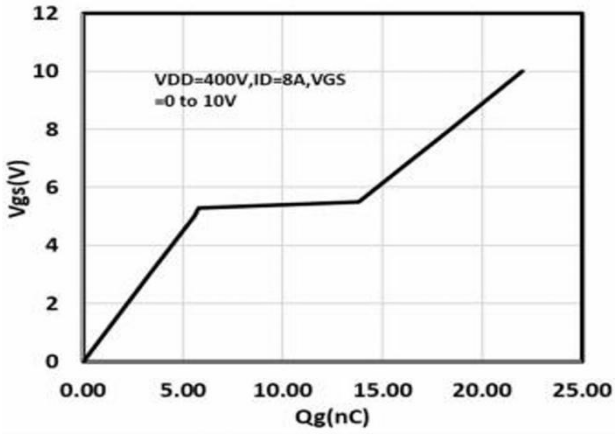
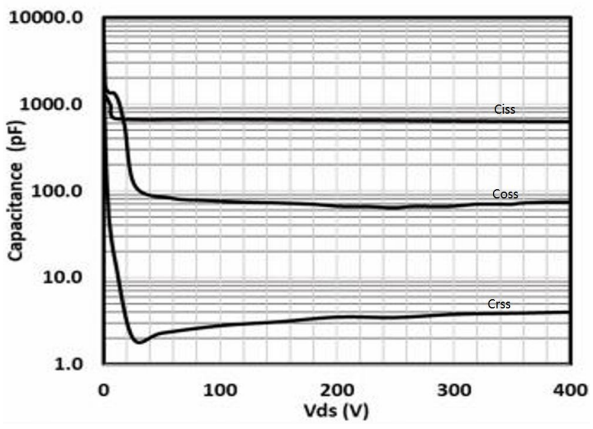


Fig.6 Typical capacitance characteristics



Typical Characteristics

Fig.7 On Resistor vs. Junction temperature

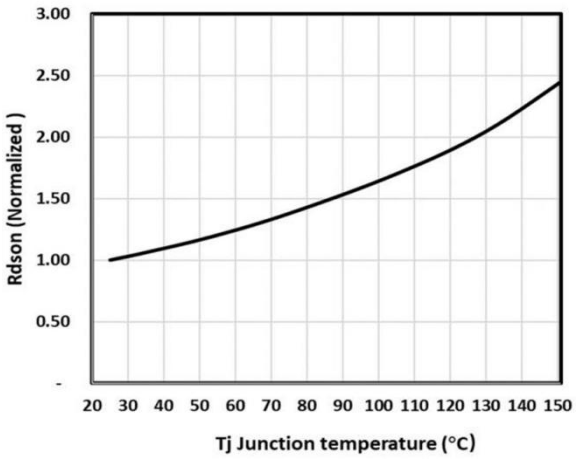


Fig.8 Drain-Source Breakdown Voltage

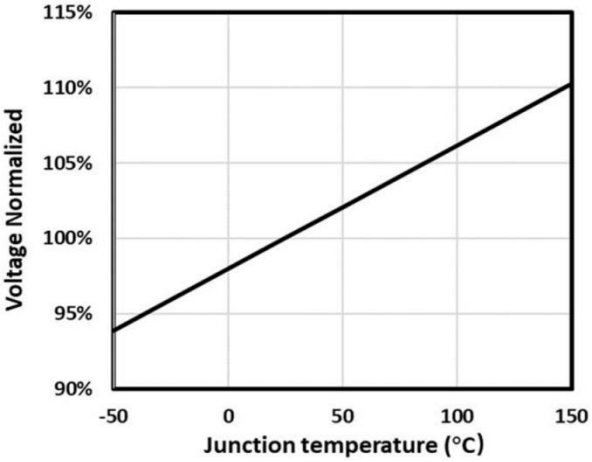
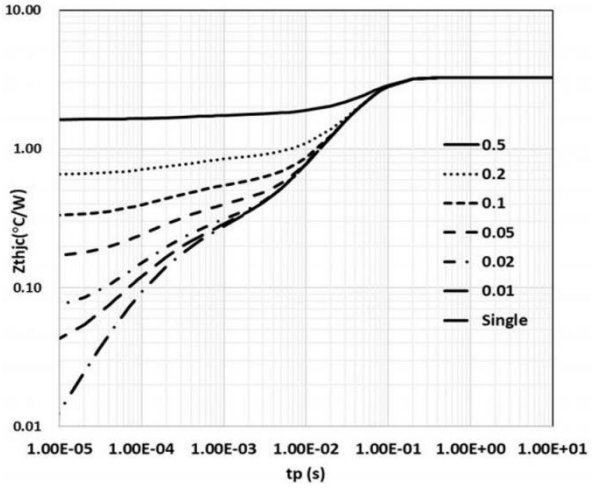
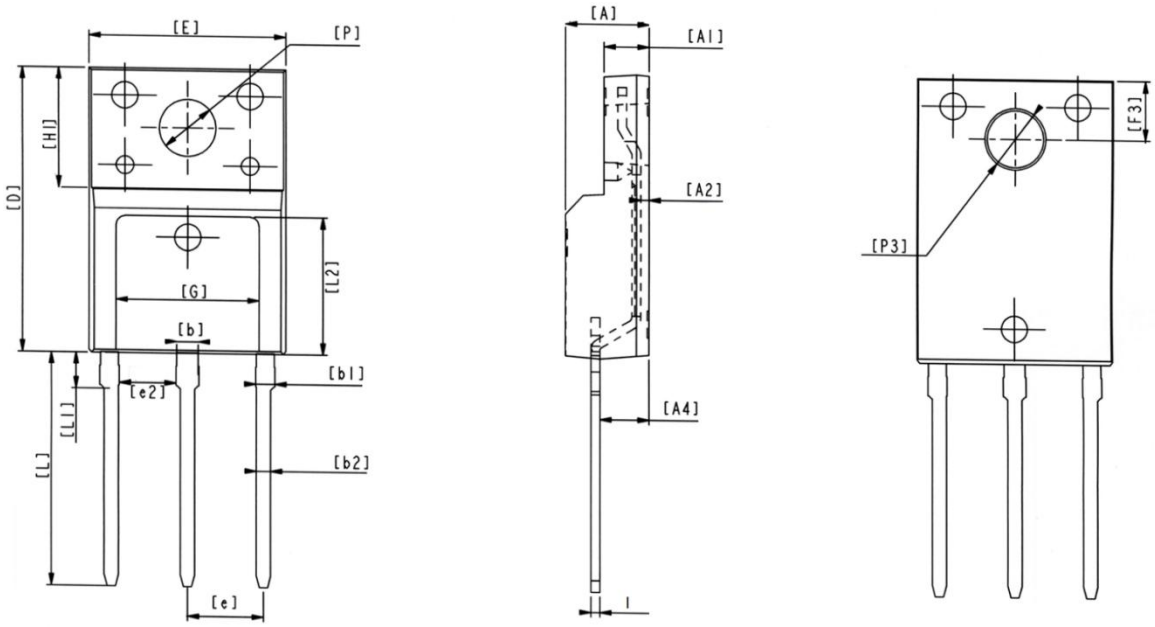


Fig.9 Transient thermal impedance



ITO-220ABW Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.500	4.900	0.177	0.193
A1	2.340	2.740	0.092	0.108
A2	0.300	0.600	0.012	0.024
A4	2.650	2.950	0.104	0.116
b	1.000	1.400	0.039	0.055
b1	0.980	1.260	0.039	0.050
b2	0.750	0.900	0.030	0.035
D	15.570	16.170	0.613	0.637
E	10.700	11.300	0.421	0.445
e	3.950	4.550	0.156	0.179
e2	3.000	-	0.118	-
F3	3.100	3.500	0.122	0.138
G	7.700	8.300	0.303	0.327
H1	6.400	7.000	0.252	0.276
L	12.680	13.280	0.499	0.523
L1	1.750	2.250	0.069	0.089
L2	7.400	7.900	0.291	0.311
P	3.000	3.300	0.118	0.130
P3	3.300	3.600	0.130	0.142
l	0.400	0.600	0.016	0.024