AP020SN650MTF

N-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
650V	480mΩ@10V	20A

Feature

- Self-aligned planar technology
- Low conduction loss

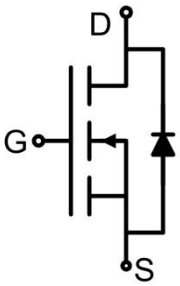
Application

- Uninterruptible power supply (UPS)
- Power factor correction (PFC)

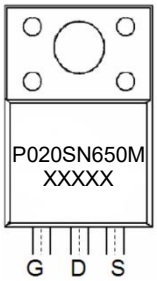
Package

ITO-220AB

Circuit diagram



Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS}=0V)	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	20	A
Pulsed Drain Current[1)]	I_{DM}	72	A
Single Pulse Avalanche Energy[2)]	E_{AS}	340	mJ
Power Dissipation[3)]	P_D	35	W
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	3.55	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=25 °C, 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 =250μA	650			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =500V, V_{GS} =0V			1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±30V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	3	3.2	5	V
Drain-source on-resistance[4)]	$R_{DS(on)}$	V_{GS} =10V, I_D =9A		380	480	mΩ
Dynamic characteristics[5)]						
Input Capacitance	C_{iss}	V_{DS} =25V, V_{GS} =0V, f =1MHz		2150		pF
Output Capacitance	C_{oss}			265		
Reverse Transfer Capacitance	C_{rss}			6.2		
Total Gate Charge	Q_g	V_{DS} =335V, V_{GS} =10V, I_D =18A		38		nC
Gate-Source Charge	Q_{gs}			12		
Gate-Drain Charge	Q_{gd}			13		
Turn-on delay time	$t_{d(on)}$	V_{DS} =335V, I_D =18A, R_G =25Ω		36		nS
Turn-on rise time	t_r			51		
Turn-off delay time	$t_{d(off)}$			80		
Turn-off fall time	t_f			44		
Source-Drain Diode characteristics						
Diode Forward Current	I_S	T_C =25℃			20	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_{SD} =18A			1.4	V
Reverse Recovery Time	T_{rr}	V_{GS} =0V, I_S =18A di/dt =100A/μs		456		nS
Reverse Recovery Charge	Q_{rr}			5.9		μC

Notes:

1) The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

2) The EAS data shows Max. rating . L=4.1mH, I_{AS}=18A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25 °C.

3) The power dissipation is limited by 150℃ junction temperature.

4) The test condition is Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤1%.

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

Typical Characteristics

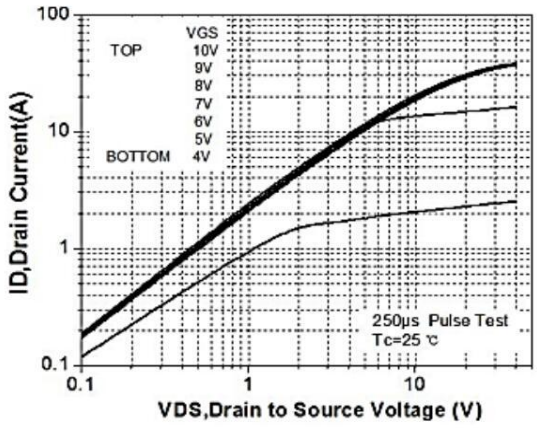


Figure 1. On-Region Characteristics

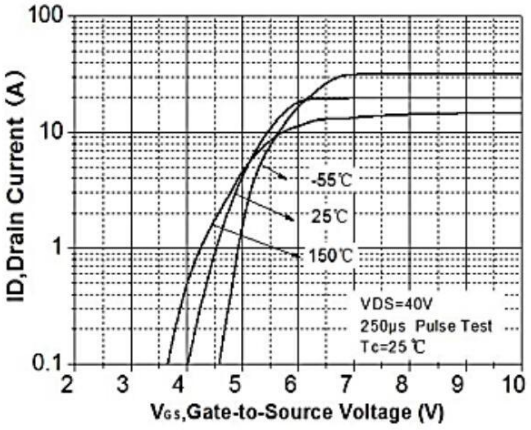


Figure 2. Transfer Characteristics

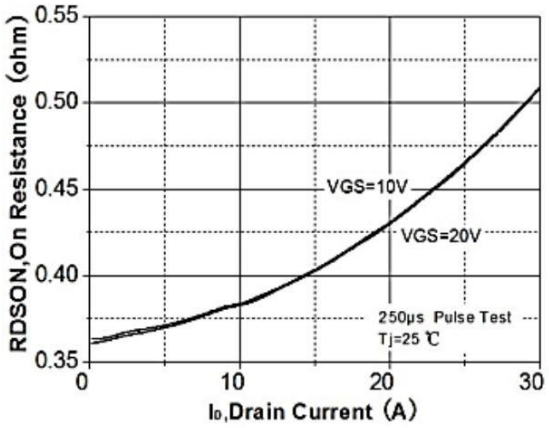


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

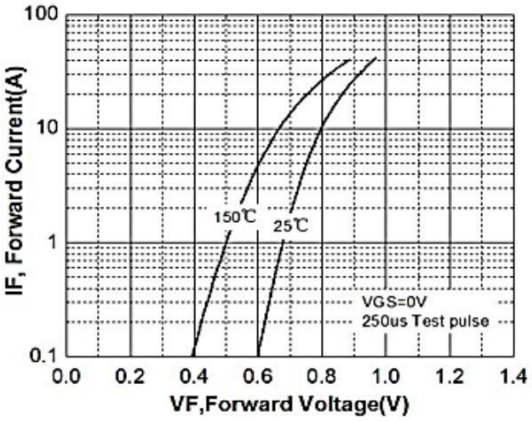


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

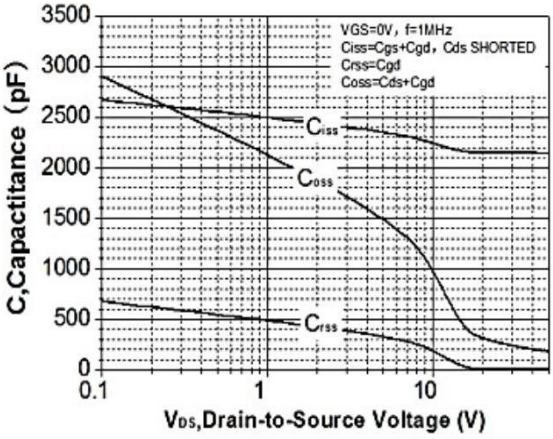


Figure 5. Capacitance Characteristics

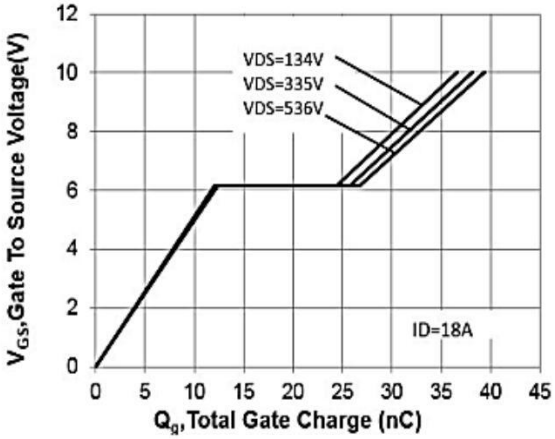


Figure 6. Gate Charge Characteristics

Typical Characteristics

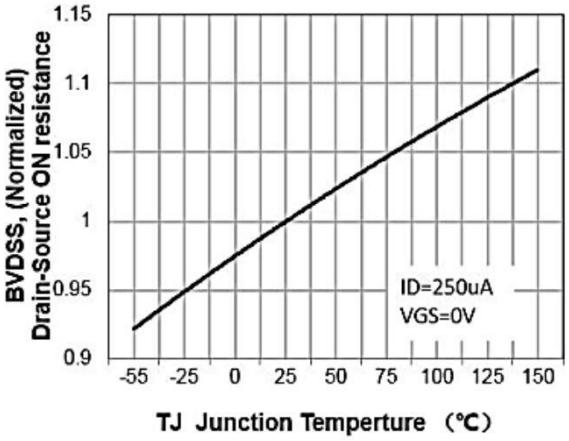


Figure 7. Breakdown Voltage Variation vs Temperature

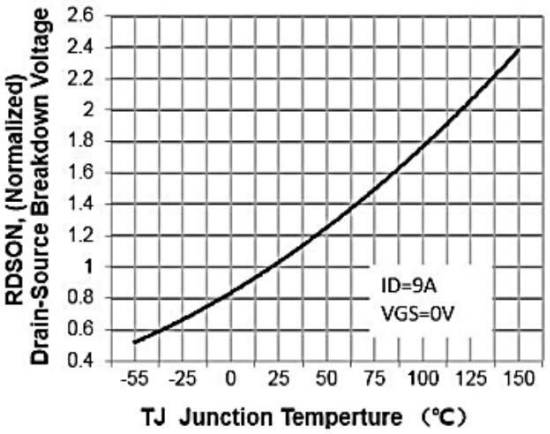


Figure 8. On-Resistance Variation vs Temperature

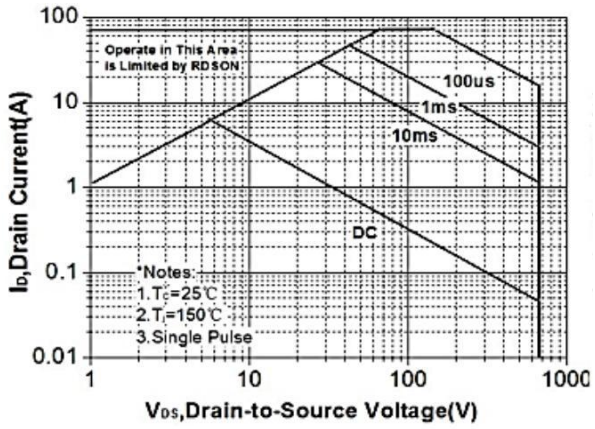


Figure 9. Maximum Safe Operating Area

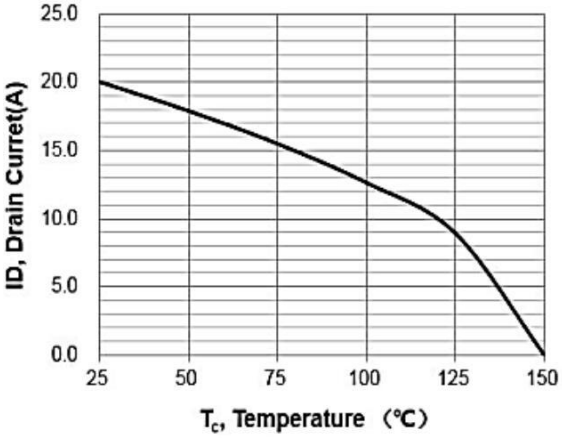


Figure 10. Maximum Drain Current vs Case Temperature

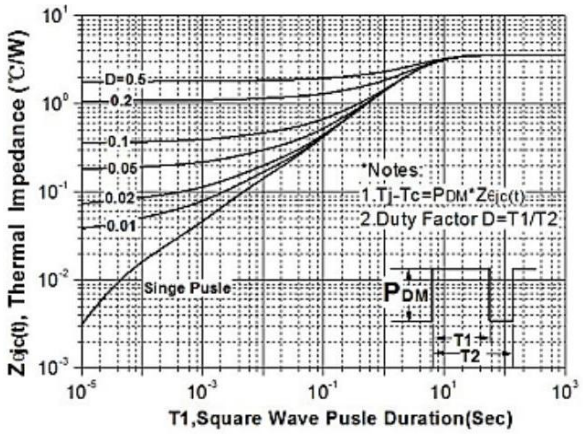
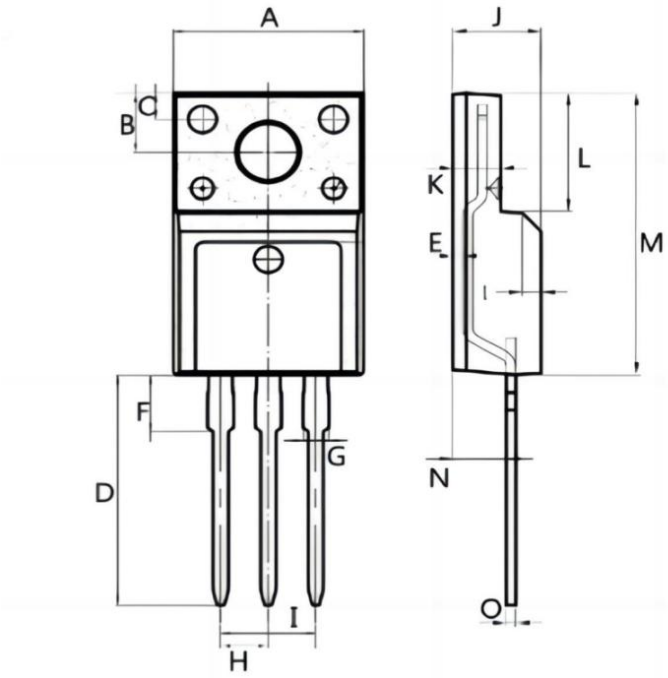


Figure 11. Transient Thermal Response Curve

ITO-220AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.900	10.300	0.390	0.406
B	2.900	3.500	0.114	0.138
C	1.150	1.450	0.045	0.057
D	12.750	13.250	0.502	0.522
E	0.550	0.750	0.022	0.030
F	3.100	3.500	0.122	0.138
G	1.250	1.450	0.049	0.057
H	2.540 BSC.		0.100 BSC.	
I	5.080 BSC.		0.200 BSC.	
J	4.550	4.750	0.179	0.187
K	2.400	2.700	0.094	0.106
L	6.350	6.750	0.250	0.266
M	15.000	16.000	0.591	0.630
N	2.750	3.150	0.108	0.124
O	0.450	0.600	0.018	0.024