AP012SN650MTF

N-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
650V	720mΩ@10V	12A

Feature

- Self-aligned planar Technology
- Low conduction loss

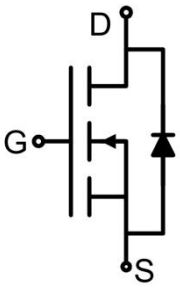
Application

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

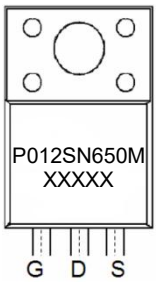
Package

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	12	A
Pulsed Drain Current[1)]	I_{DM}	44	A
Single Pulse Avalanche Energy[2)]	E_{AS}	304	mJ
Power Dissipation[3)]	P_D	32.1	W
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	3.9	℃/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} =650V, 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	2	3.5	4	V
Drain-source on-resistance[4)]	$R_{DS(on)}$	V_{GS} =10V, I_D =5.5A		600	720	mΩ
Dynamic characteristics[5)]						
Input Capacitance	C_{iss}	V_{DS} =25V, V_{GS} =0V, f =1MHz		1528		pF
Output Capacitance	C_{oss}			147		
Reverse Transfer Capacitance	C_{rss}			16		
Total Gate Charge	Q_g	V_{DS} =520V, V_{GS} =10V, I_D =11A		46		nC
Gate-Source Charge	Q_{gs}			7		
Gate-Drain Charge	Q_{gd}			23		
Turn-on delay time	$t_{d(on)}$	V_{DS} =325V, I_D =11A, R_G =25Ω		43		nS
Turn-on rise time	t_r			29		
Turn-off delay time	$t_{d(off)}$			196		
Turn-off fall time	t_f			51		
Source-Drain Diode characteristics						
Diode Forward Current	I_S	T_C =25℃			12	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S =5.5A			1.4	V
Reverse Recovery Time	T_{rr}	V_{GS} =0V, I_S =11A di/dt = 100A/μs		482		nS
Reverse Recovery Charge	Q_{rr}			2.85		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 .I_{AS}=11A, V_{DD} =50V, R_G =25Ω, Starting T_J =25ºC.

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

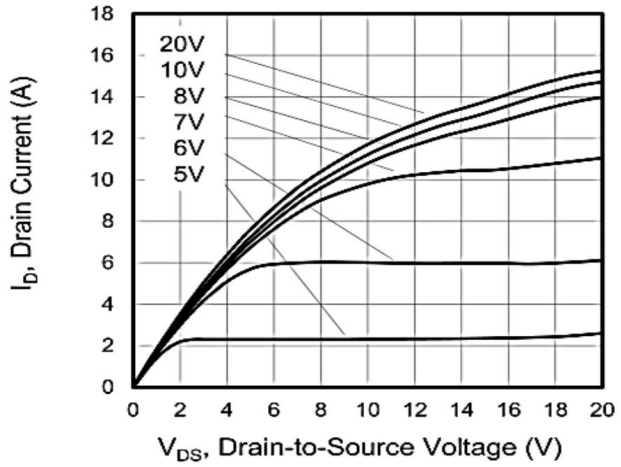


Figure 1. Output Characteristics (T J = 25ºC

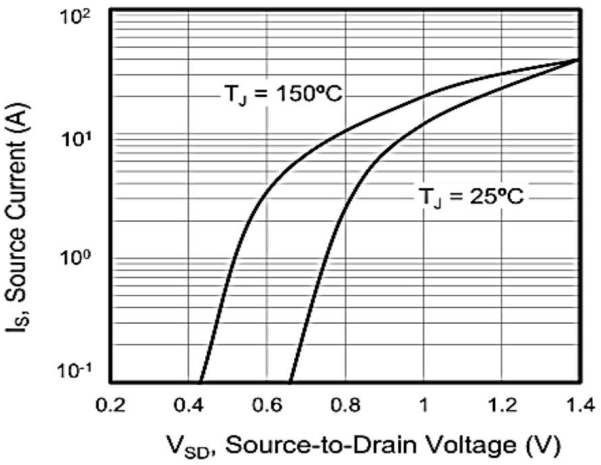


Figure 2. Body Diode Forward Voltage

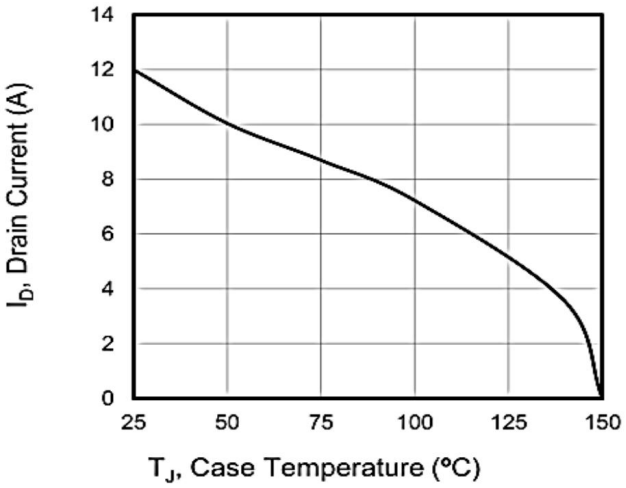


Figure 3. Drain Current vs. Temperature

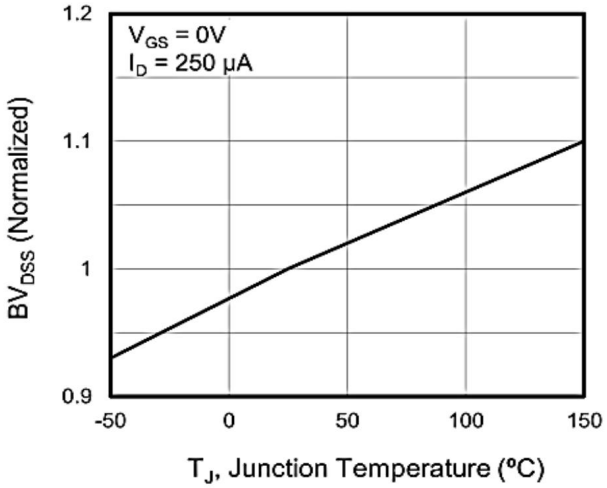


Figure 4. BV DSS Variation vs. Temperature

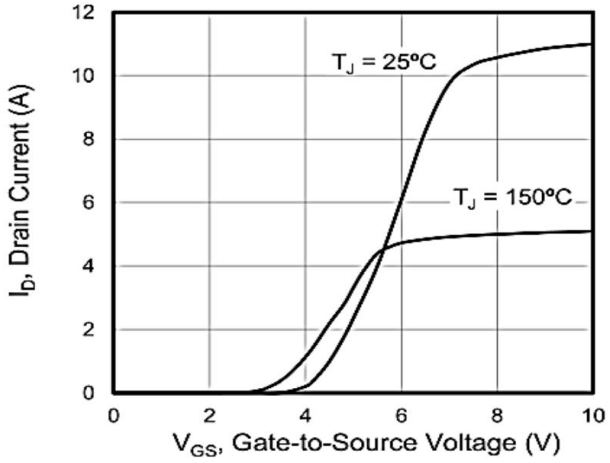


Figure 5. Transfer Characteristics

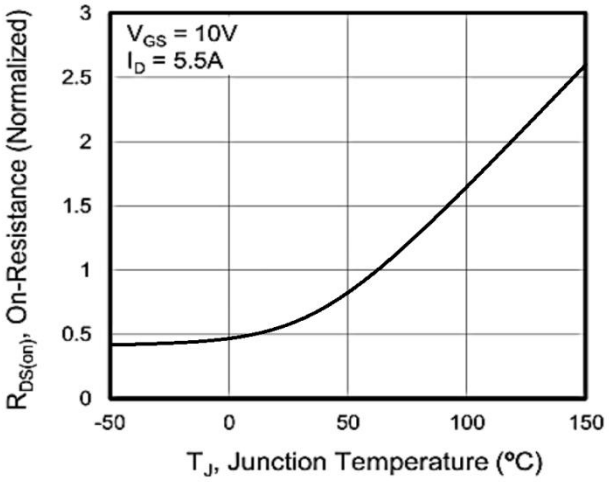


Figure 6. On-Resistance vs. Temperature

Typical Characteristics

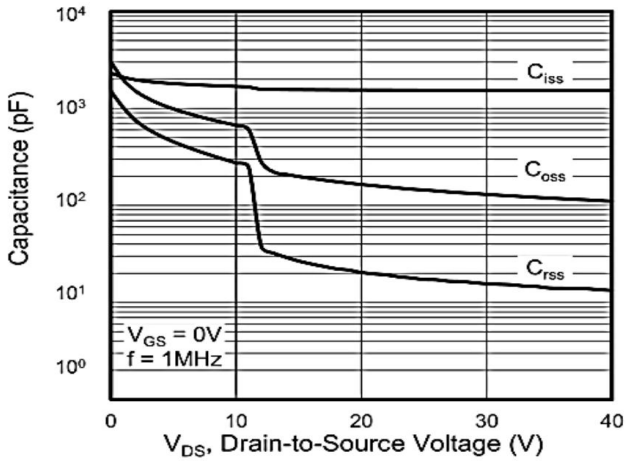
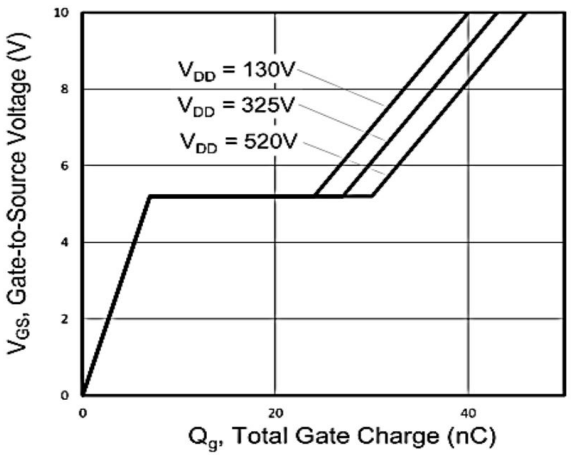


Figure 7. Capacitance Figure



8. Gate Charge

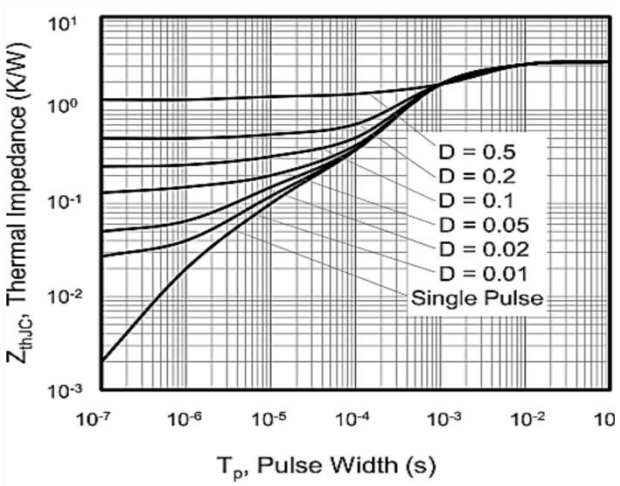
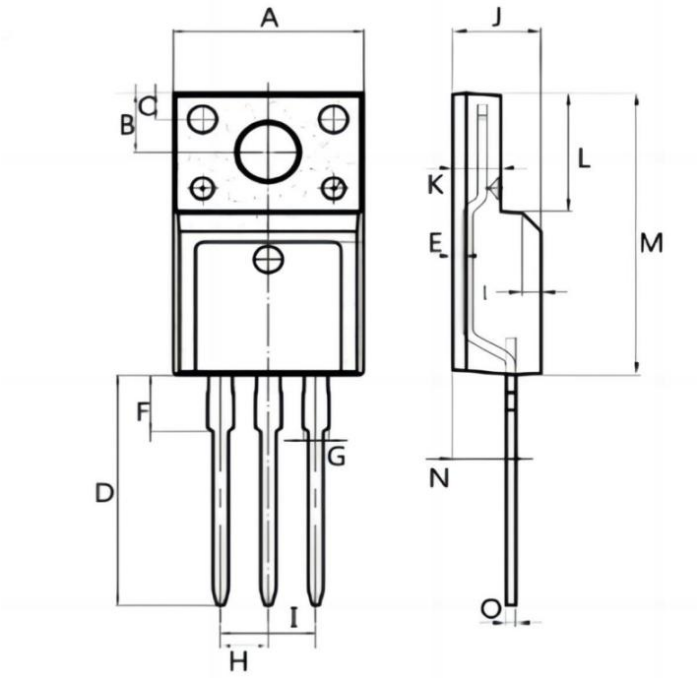


Figure 9. Transient Thermal Impedance

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