



12N65

12A N-Channel Power MOSFET

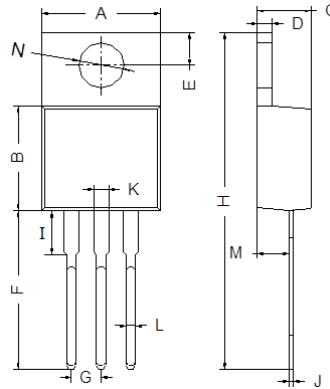
Features

New technology for high voltage device
 Low on-resistance and low conduction losses
 Small package
 Ultra Low Gate Charge cause lower driving requirements
 100% Avalanche Tested
 ROHS compliant

Mechanical Data

Case : TO-220AB
Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
Polarity : As marked
Mounting Position : Any

TO-220AB

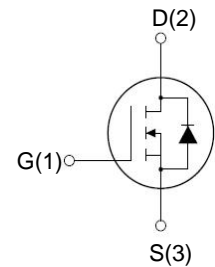
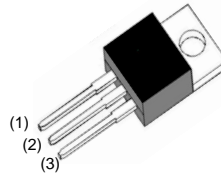


TO-220AB		
Dim	Min	Max
A	9.80	10.30
B	8.30	8.90
C	4.37	4.77
D	1.10	1.45
E	2.62	2.87
F	13.14	13.74
G	2.41	2.67
H	28.40	29.16
I	3.55	4.05
J	0.35	0.58
K	1.20	1.32
L	0.68	0.94
M	2.40	2.60
N	3.71	3.91

All Dimensions in mm

Application

Power factor correction (PFC)
 Switched mode power supplies(SMPS)
 Uninterruptible Power Supply (UPS)



Maximum Ratings And Electrical Characteristics

Ratings at 25°C ambient temperature unless otherwise specified. Single phase half-wave 60Hz, resistive or inductive load, for capacitive load current derate by 20%.

Table 1. Absolute Maximum Ratings (T_C=25°C)

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V _{DS}	650	V	
Gate-Source Voltage	V _{GS}	± 30		
Continuous Drain Current (T _J = 150 °C)	V _{GS} at 10 V	T _C = 25 °C	12	A
		T _C = 100 °C	8	
Pulsed Drain Current ^a	I _{DM}	28		
Linear Derating Factor		1.4	W/°C	
Single Pulse Avalanche Energy ^b	E _{AS}	226	mJ	
Maximum Power Dissipation	P _D	156	W	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C	
Drain-Source Voltage Slope	dV/dt	37	V/ns	
Reverse Diode dV/dt ^d				28
Soldering Recommendations (Peak Temperature) ^c	for 10 s	300	°C	

Notes


- Repetitive rating; pulse width limited by maximum junction temperature.
- V_{DD} = 50 V, starting T_J = 25 °C, L = 28.2 mH, R_g = 25 Ω, I_{AS} = 4 A.
- 1.6 mm from case.
- I_{SD} ≤ I_D, dI/dt = 100 A/μs, starting T_J = 25 °C.



THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.8	

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	650	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}, I_D = 1\text{ mA}$	-	0.78	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	-	4	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
		$V_{GS} = \pm 30\text{ V}$	-	-	± 1	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 520\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	10	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 6\text{ A}$	-	0.33	0.38	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 30\text{ V}, I_D = 6\text{ A}$	-	3.5	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}, f = 1\text{ MHz}$	-	1224	-	pF
Output Capacitance	C_{oss}		-	65	-	
Reverse Transfer Capacitance	C_{rss}		-	4	-	
Effective Output Capacitance, Energy Related ^a	$C_{o(er)}$	$V_{DS} = 0\text{ V to } 520\text{ V}, V_{GS} = 0\text{ V}$	-	50	-	
Effective Output Capacitance, Time Related ^b	$C_{o(tr)}$		-	160	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}, I_D = 6\text{ A}, V_{DS} = 520\text{ V}$	-	35	70	nC
Gate-Source Charge	Q_{gs}		-	9	-	
Gate-Drain Charge	Q_{gd}		-	16	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 520\text{ V}, I_D = 6\text{ A}, V_{GS} = 10\text{ V}, R_g = 9.1\text{ }\Omega$	-	16	32	ns
Rise Time	t_r		-	19	38	
Turn-Off Delay Time	$t_{d(off)}$		-	35	70	
Fall Time	t_f		-	18	36	
Gate Input Resistance	R_g	$f = 1\text{ MHz}, \text{open drain}$	-	0.81	-	Ω
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	12	A
Pulsed Diode Forward Current	I_{SM}		-	-	28	
Diode Forward Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 6\text{ A}, V_{GS} = 0\text{ V}$	-	1.0	1.2	V
Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 6\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_R = 25\text{ V}$	-	309	618	ns
Reverse Recovery Charge	Q_{rr}		-	3.8	7.6	μC
Reverse Recovery Current	I_{RRM}		-	21	-	A

Notes

- $C_{oss(er)}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .
- $C_{oss(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics

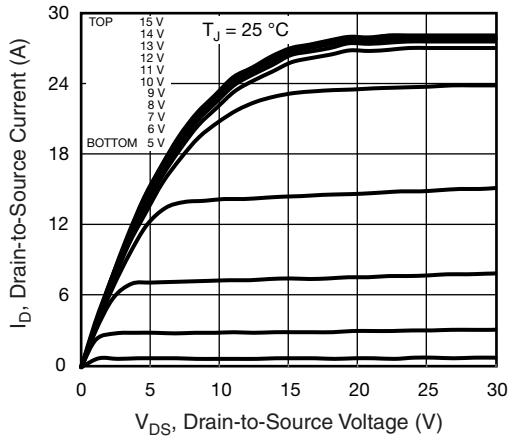


Fig. 4 - Normalized On-Resistance vs. Temperature

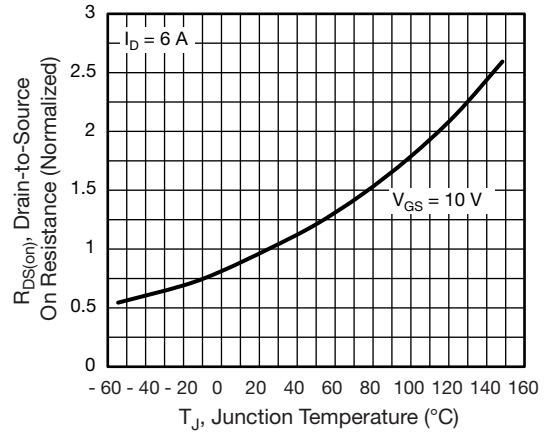


Fig. 2 - Typical Output Characteristics

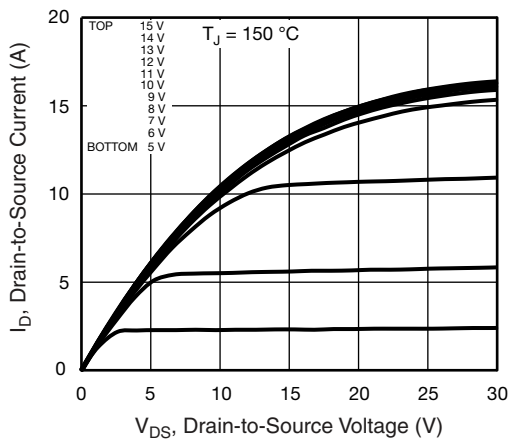


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

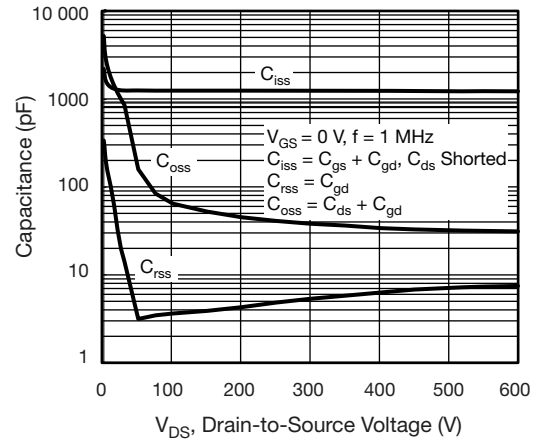


Fig. 3 - Typical Transfer Characteristics

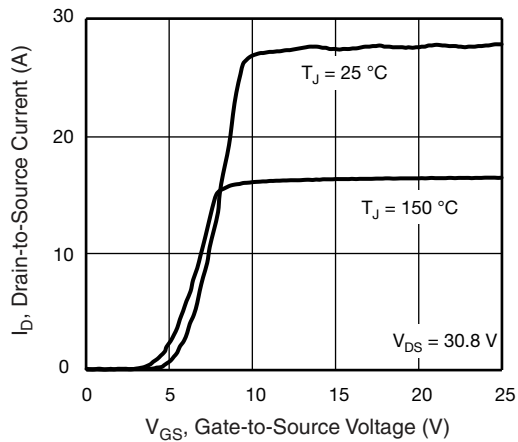


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

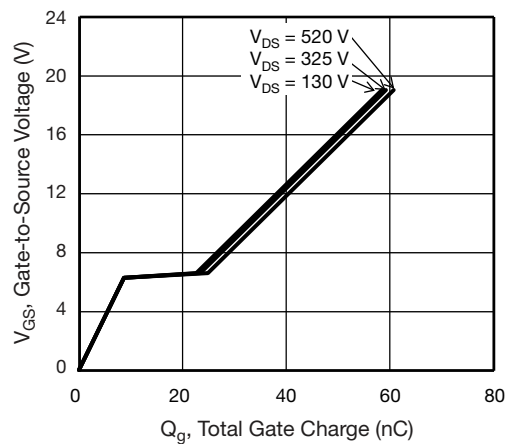




Fig. 7 - Typical Source-Drain Diode Forward Voltage

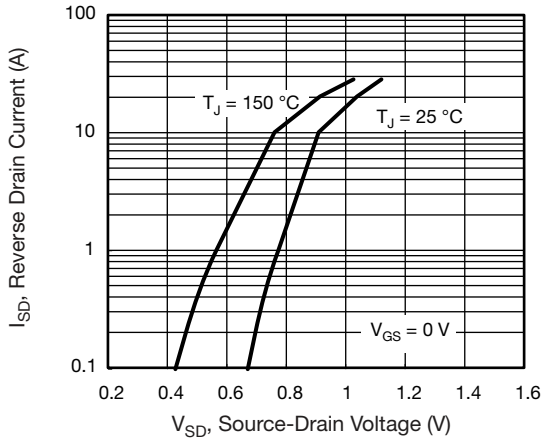


Fig. 9 - Maximum Drain Current vs. Case Temperature

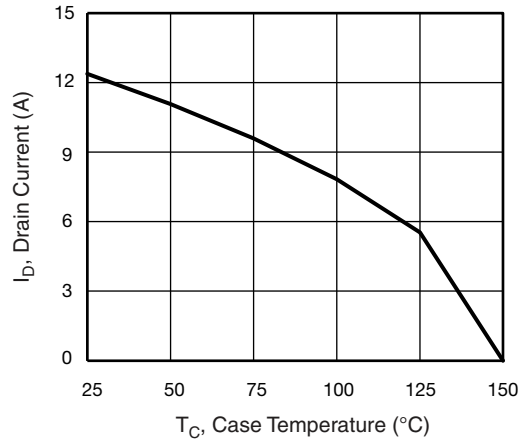


Fig. 8 - Maximum Safe Operating Area

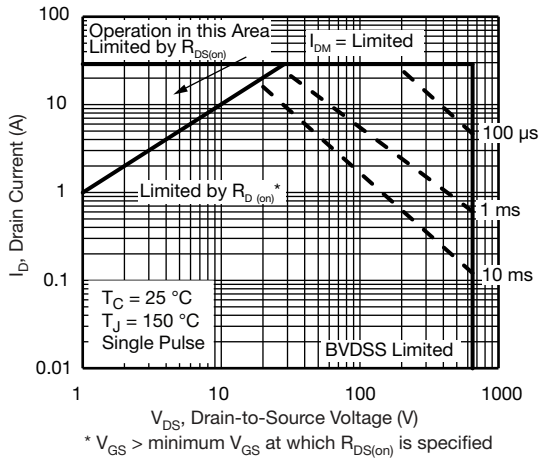


Fig. 10 - Temperature vs. Drain-to-Source Voltage

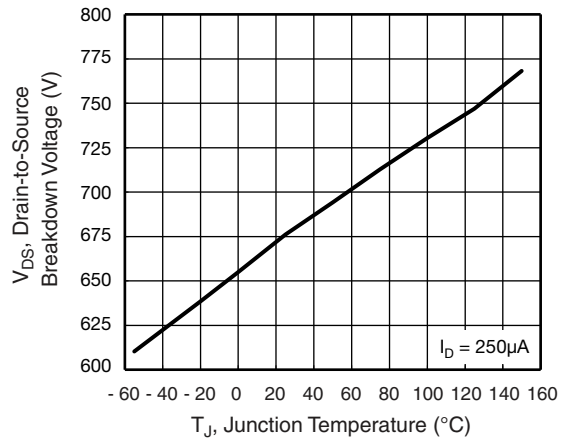


Fig. 11 - Normalized Thermal Transient Impedance, Junction-to-Case

