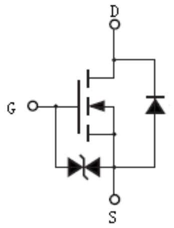
N-Channel Enhancement Mode MOSFET

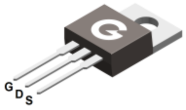
BL9N90K BL9N90KF

Features

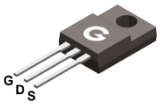
- Low $R_{DS(ON)}$
- Fast switching
- Low gate charge
- Low Reverse transfer capacitances
- RoHS compliant with Halogen-free

HF





TO-220AB



ITO-220AB

Mechanical Data

- Case: TO-220AB, ITO-220AB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matted-Tin plated; Solderable Per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BL9N90K	TO-220AB	50 pcs / Tube	9N90K
BL9N90KF	ITO-220AB	50 pcs / Tube	9N90KF

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	900	V
Gate-to-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current (T_C = 25°C)	I_D	9	A
Continuous Drain Current (T_C = 100°C)	I_D	5.7	A
Pulsed Drain Current (t_p = 10μs, T_C = 25°C)	I_{DM}	36	A
Single Pulse Avalanche Energy ^{*2}	E_{AS}	500	mJ
Power Dissipation (TO-220AB, T_C = 25°C)	P_D	250	W
Power Dissipation (ITO-220AB, T_C = 25°C)		42	W
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case (TO-220AB)	$R_{\theta JC}$	-	-	0.5	°C/W
Thermal Resistance Junction-to-Case (ITO-220AB)		-	-	3	°C/W
Thermal Resistance Junction-to-Air (TO-220AB)	$R_{\theta JA}$	-	-	50	°C/W
Thermal Resistance Junction-to-Air (ITO-220AB)		-	-	62.5	°C/W

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	900	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 900V, V_{GS} = 0V	-	-	25	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance [*1]	V_{GS} = 10V, I_D = 4.5A	-	-	1.1	Ω
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2	-	4	V
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1MHz	-	2716	-	pF
C_{OSS}	Output Capacitance		-	211	-	
C_{RSS}	Reverse Transfer Capacitance		-	11	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time [*3]	V_{DD} = 450V I_D = 9A R_G = 10Ω	-	30.4	-	ns
t_r	Turn-on Rise Time [*3]		-	41.6	-	
$t_{d(OFF)}$	Turn-Off Delay Time [*3]		-	82	-	
t_f	Turn-Off Fall Time [*3]		-	52	-	
Q_G	Total Gate-Charge	V_{DD} = 720V V_{GS} = 10V I_D = 9A	-	58	-	nC
Q_{GS}	Gate to Source Charge		-	10.6	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	23.4	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage [*1]	I_{SD} = 9A, V_{GS} = 0V	-	-	1.5	V
trr	Reverse Recovery Time	I_{SD} = 9A, V_{GS} = 0V d_i/d_t = 100A/μs	-	845	-	ns
Qrr	Reverse Recovery Charge		-	8	-	μC

Notes:

1. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
2. The E_{AS} data shows Max. rating. The test condition is V_{DD} = 100V, V_{GS} = 10V, L = 50mH
3. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

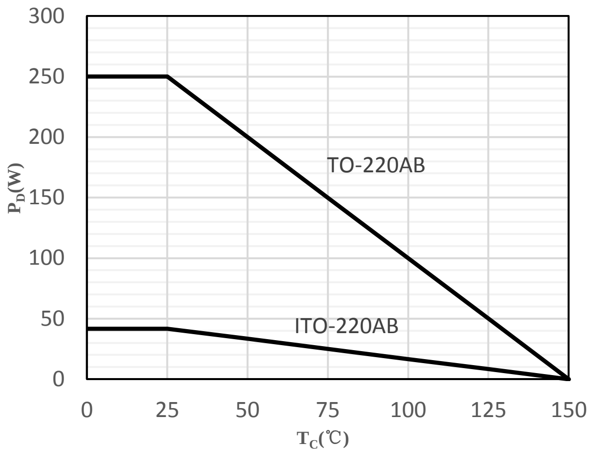


Fig 1 Power Dissipation

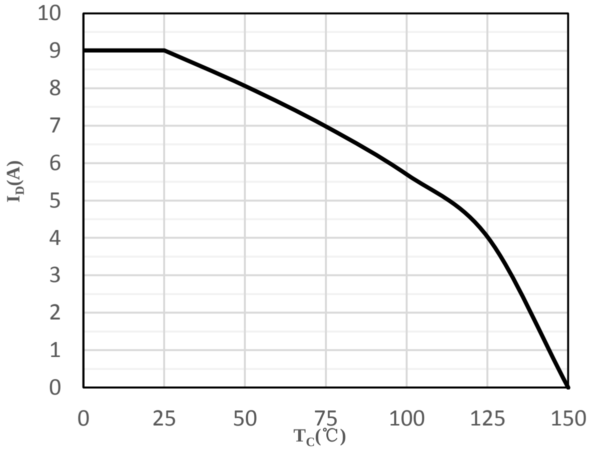


Fig 2 Drain Current

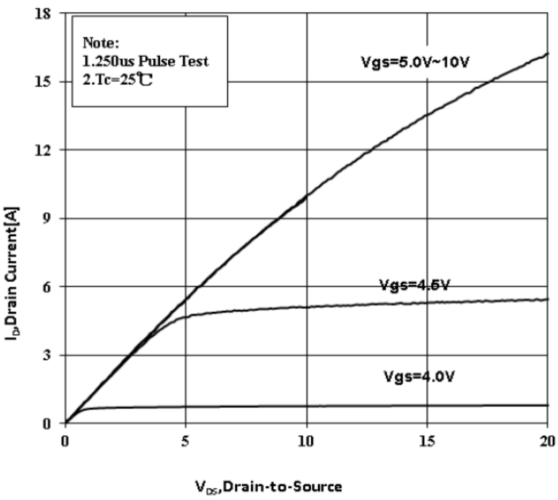


Fig 3 Typical Output Characteristics

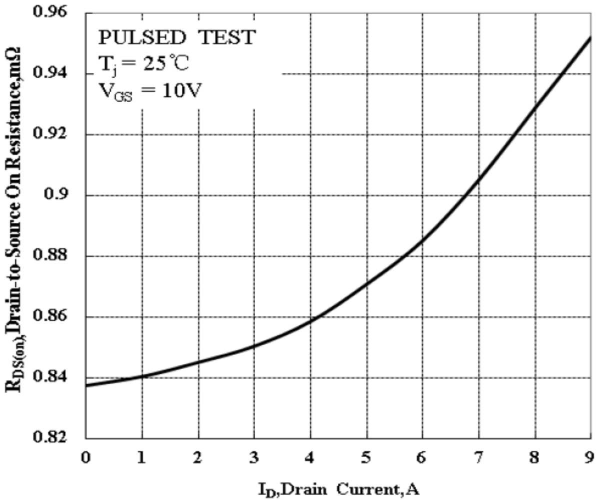
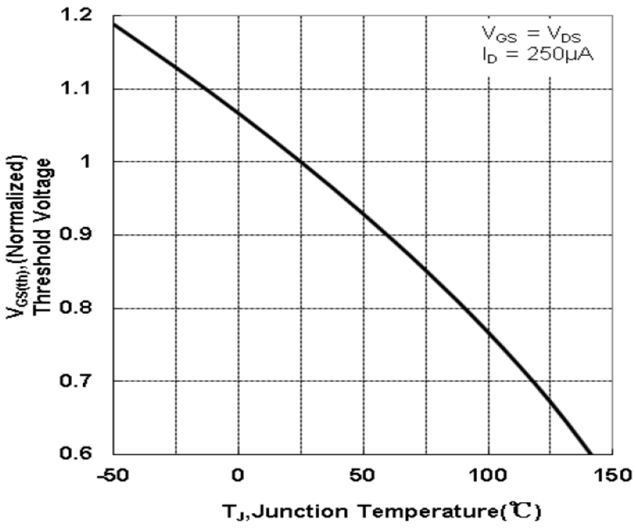


Fig 4 On-Resistance vs. Drain Current and Gate Voltage



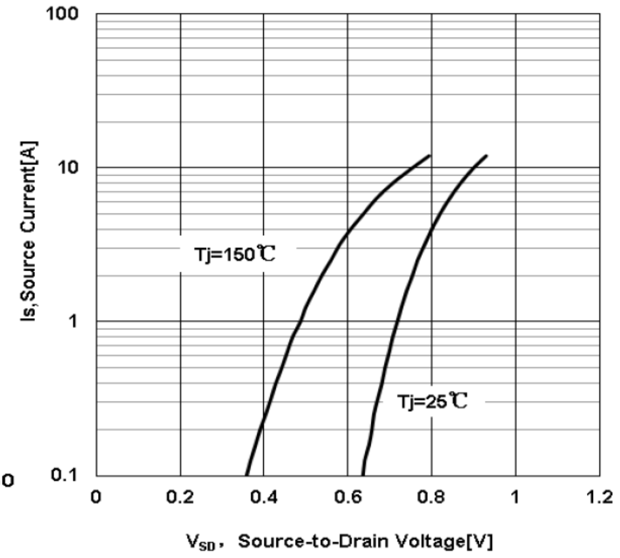


Fig 5 Normalized $V_{GS(th)}$ vs. Junction Temperature

Fig 6 Body-Diode Characteristics

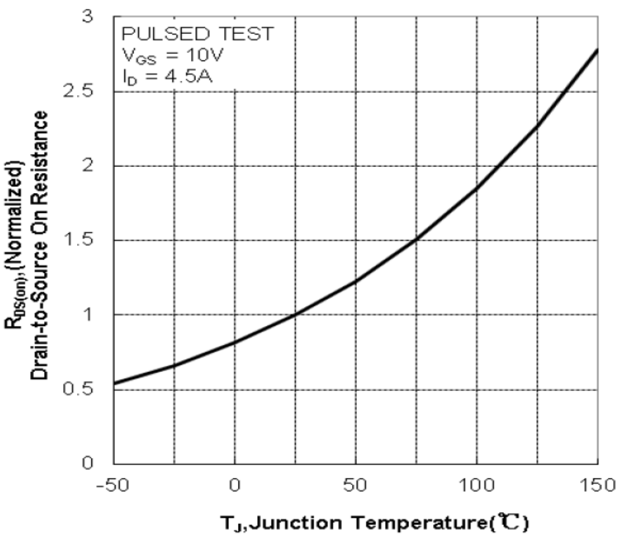


Fig 7 Normalized On-Resistance vs. Junction Temperature

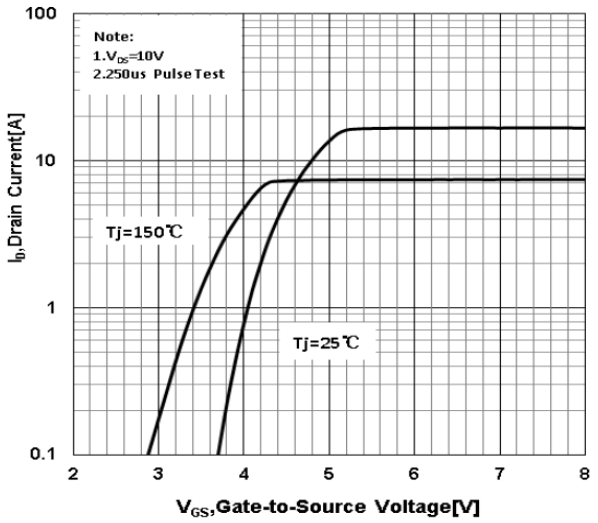


Fig 8 Transfer Characteristics

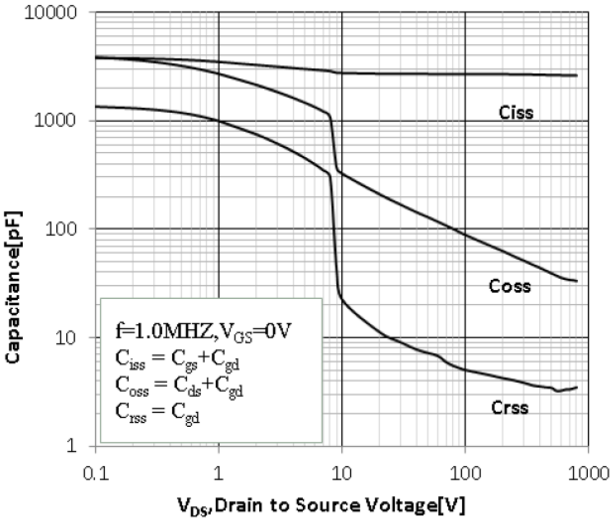


Fig 9 Capacitance Characteristics

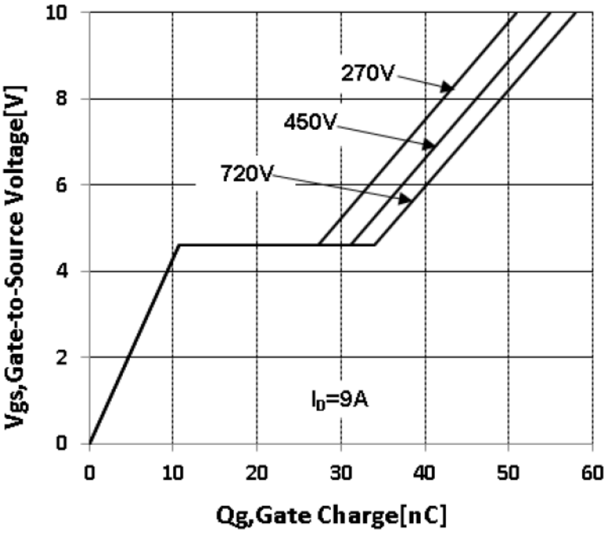


Fig 10 Gate-Charge Characteristics

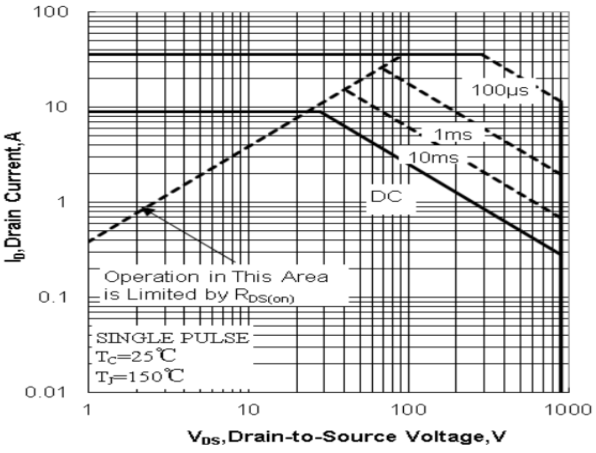


Fig 11 Safe Operation Area (TO-220AB)

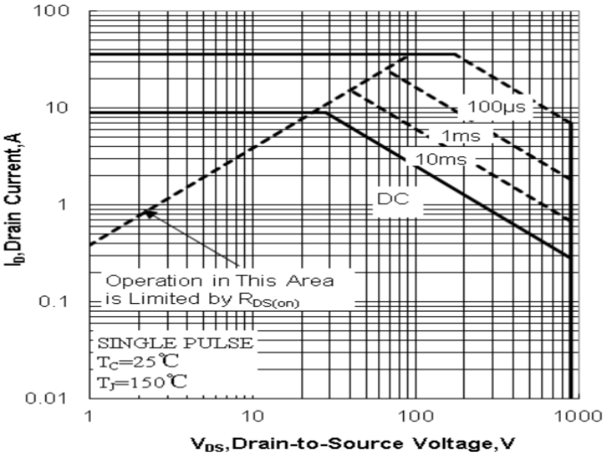
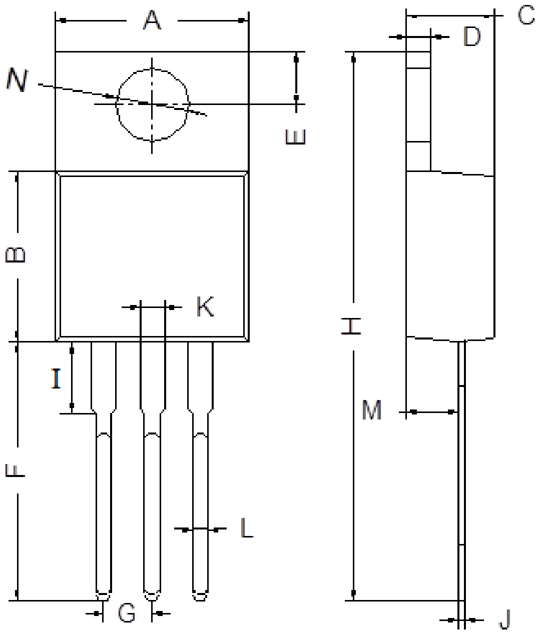
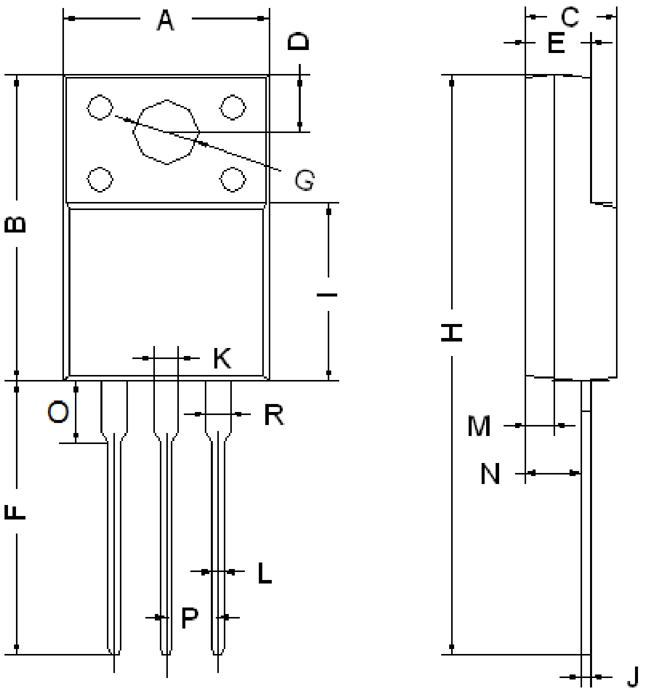


Fig 12 Safe Operation Area (ITO-220AB)

Package Outline Dimensions (Unit: mm)



TO-220AB		
Dimension	**Min.**	**Max.**
A	9.80	10.30
B	8.70	9.10
C	4.37	4.77
D	1.07	1.47
E	2.64	2.84
F	13.14	13.74
G	2.44	2.64
H	28.03	28.83
I	3.50	4.00
J	0.28	0.48
K	1.22	1.32
L	0.71	0.91
M	2.40	2.60
N	3.76	3.96



ITO-220AB		
Dimension	**Min.**	**Max.**
A	9.90	10.30
B	14.80	15.20
C	4.30	4.70
D	2.50	2.90
E	2.80	3.30
F	13.00	13.60
G	3.10	3.30
H	28.00	28.60
I	7.90	8.90
J	0.40	0.60
L	0.70	0.90
M	1.30	1.50
N	2.60	2.80
O	2.60	3.10
P	2.45	2.65
K/R	1.10	1.30