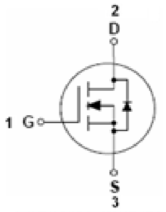
N-Channel Enhancement Mode MOSFET

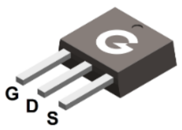
BL4N60I BL4N60D

Features

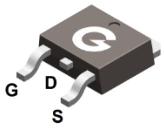
- Low $R_{DS(ON)}$
- Fast switching
- Low gate charge
- Low Reverse transfer capacitances
- RoHS compliant with Halogen-free

HF





TO-251



TO-252

Mechanical Data

- Case: TO-251, TO-252
- 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
BL4N60I	TO-251	80 pcs / Tube	4N60I
BL4N60D	TO-252	80pcs / Tube or 2500pcs / Tape & Reel	4N60D

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	600	V
Gate-to-Source Voltage	V_{GSS}	±30	V
Continuous Drain Current (T_C = 25°C)	I_D	4	A
Continuous Drain Current (T_C = 100°C)		2.5	A
Pulsed Drain Current (t_p = 10μs, T_C = 25°C)	I_{DM}	16	A
Single Pulse Avalanche Energy ^{*2}	E_{AS}	200	mJ
Power Dissipation (T_C = 25°C)	P_D	78	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	$R_{\theta JC}$	-	-	1.6	°C/W
Thermal Resistance Junction-to-Air	$R_{\theta JA}$	-	-	100	°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	600	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *1	V_{GS} = 10V, I_D = 2A	-	-	2.8	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	-	610	-	pF
C_{OSS}	Output Capacitance		-	53	-	
C_{RSS}	Reverse Transfer Capacitance		-	3.5	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *3	V_{DD} = 325V I_D = 4A R_G = 10Ω	-	14	-	ns
t_r	Turn-on Rise Time *3		-	16	-	
$t_{d(OFF)}$	Turn-Off Delay Time *3		-	32	-	
t_f	Turn-Off Fall Time *3		-	11	-	
Q_G	Total Gate-Charge	V_{DD} = 520V V_{GS} = 10V I_D = 4A	-	14.5	-	nC
Q_{GS}	Gate to Source Charge		-	3	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	6.5	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *1	I_{SD} = 4A, V_{GS} = 0V	-	-	1.5	V
trr	Reverse Recovery Time	I_{SD} = 4A, V_{GS} = 0V d_i/d_t = 100A/μs	-	256	-	ns
Qrr	Reverse Recovery Charge		-	1.2	-	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} = 15V, L = 50mH
3. Guaranteed by design, not subject to production

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

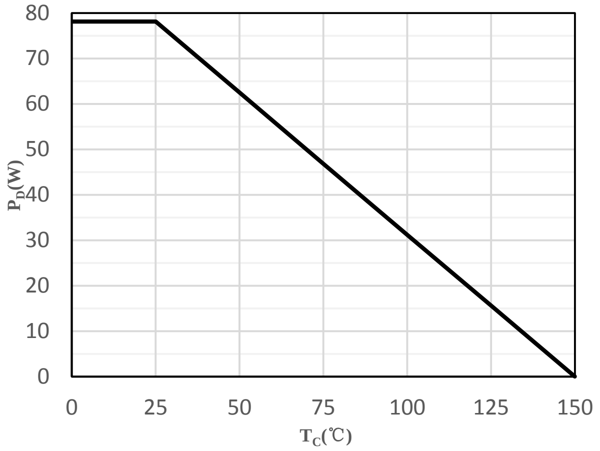


Fig 1 Power Dissipation

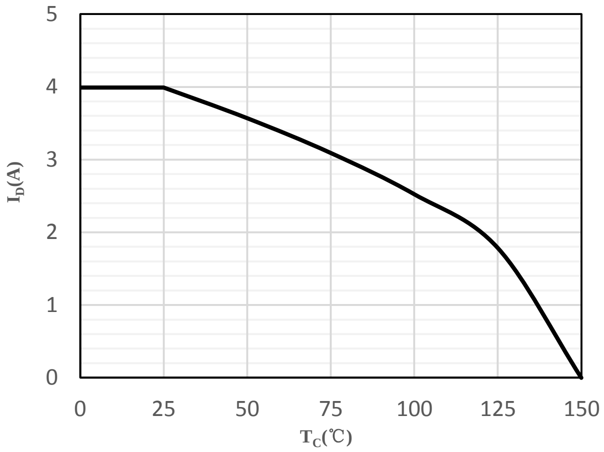


Fig 2 Drain Current

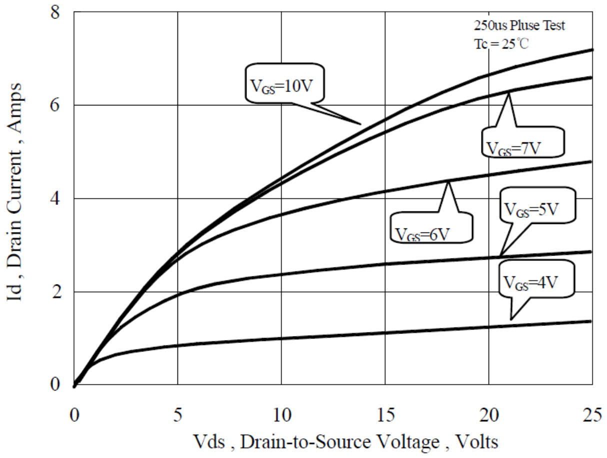


Fig 3 Typical Output Characteristics

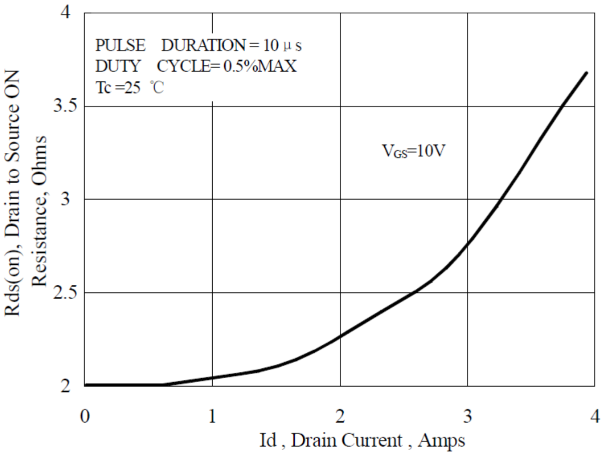


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

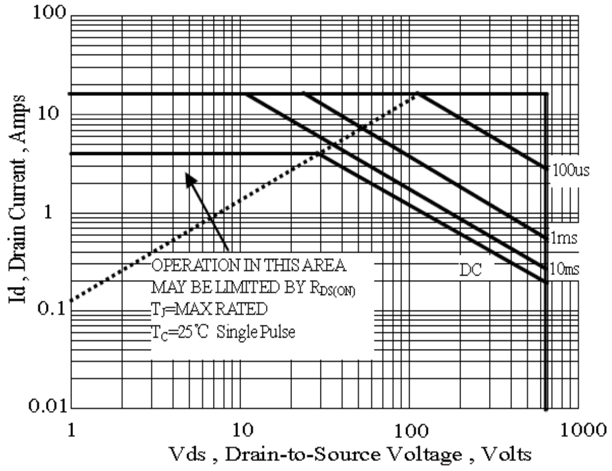


Fig 5 Safe Operation Area

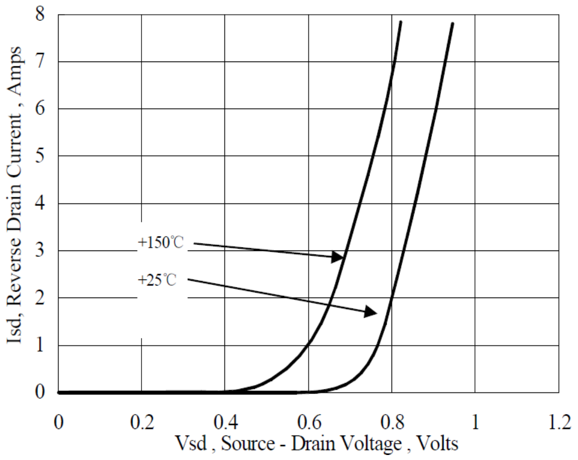


Fig 6 Body-Diode Characteristics

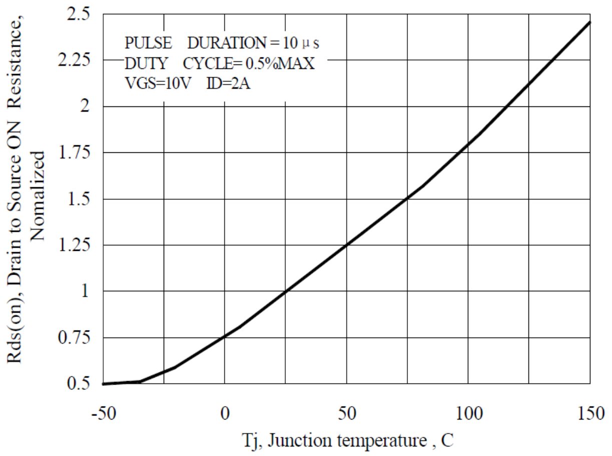


Fig 7 Normalized On-Resistance vs. Junction Temperature

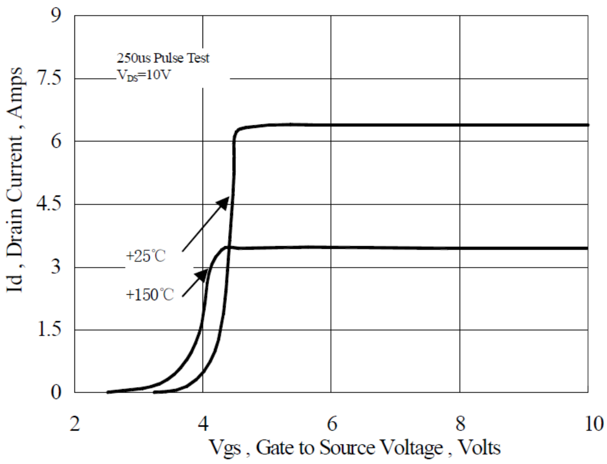


Fig 8 Transfer Characteristics

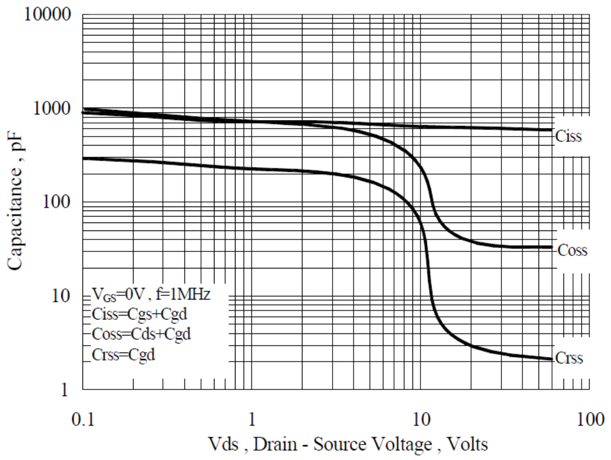


Fig 9 Capacitance Characteristics

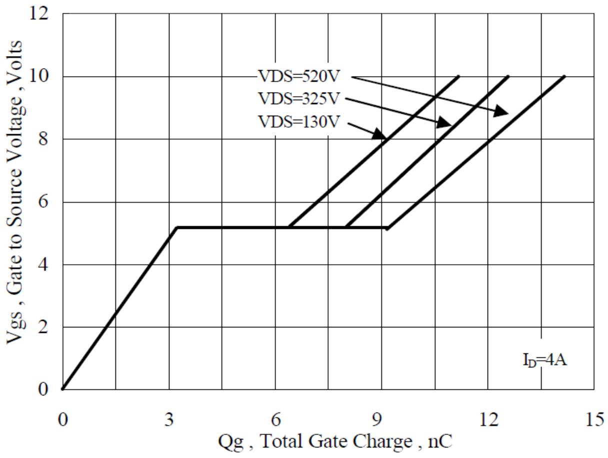


Fig 10 Gate-Charge Characteristics

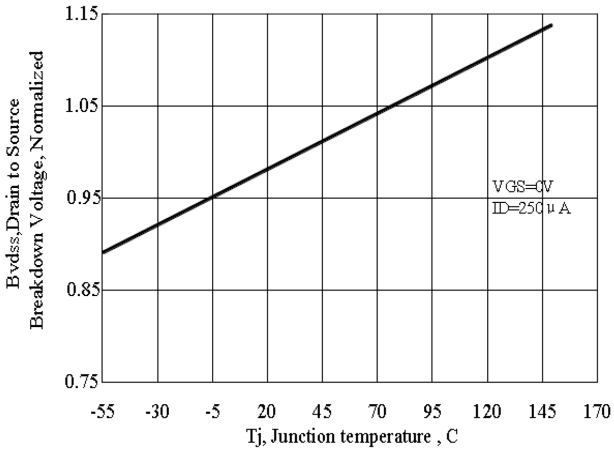


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

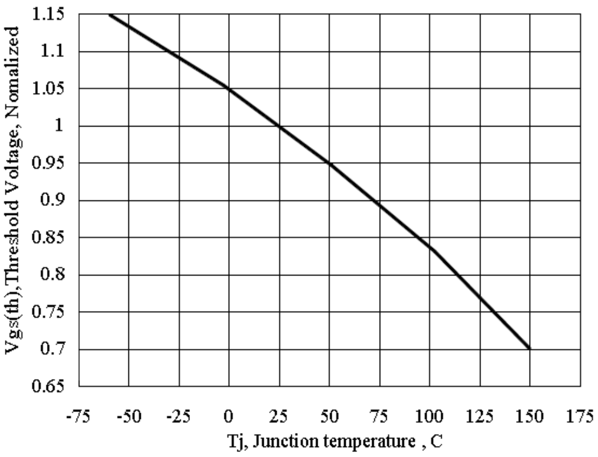
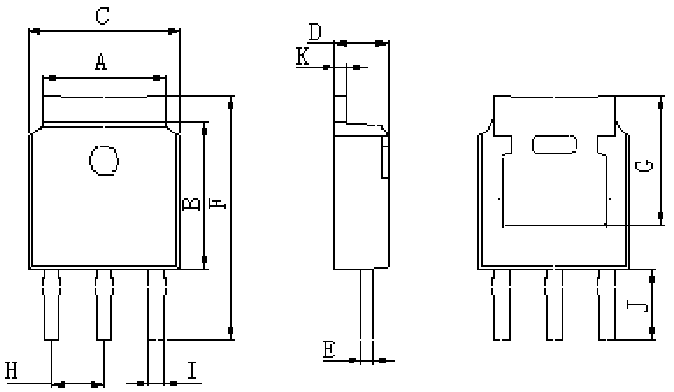
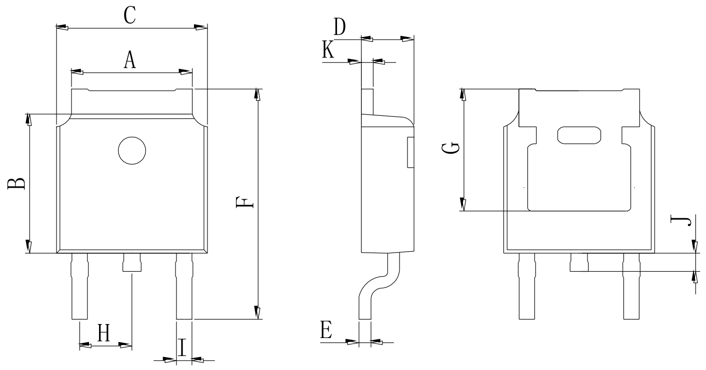


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



TO-251		
Dimension	**Min.**	**Max.**
A	5.05	5.65
B	5.80	6.40
C	6.25	6.85
D	2.20	2.40
E	0.40	0.60
F	11.00	11.60
G	5.05	5.65
H	2.10	2.50
I	0.70	0.90
J	4.00	4.40
K	0.40	0.60



TO-252		
Dimension	**Min.**	**Max.**
A	5.05	5.65
B	5.80	6.40
C	6.25	6.85
D	2.20	2.40
E	0.40	0.60
F	9.71	10.31
G	5.05	5.65
H	2.10	2.50
I	0.70	0.90
J	0.50	0.70
K	0.40	0.60

Mounting Pad Layout (Unit: mm)

TO-252