N-Channel Enhancement Mode MOSFET

BL013N10TH-TL

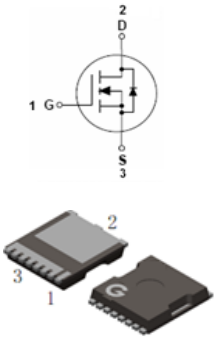
Features

- Advanced Shielded-Gate Trench technology
- Low on-resistance
- Superior thermal resistance
- RoHS compliant with Halogen-free

HF

Mechanical Data

- Case: TOLL
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TOLL

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BL013N10TH-TL	TOLL	2000 pcs / Tape & Reel	013N10TH

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	100	V
Gate-to-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current (T_C = 25°C)	I_D	400	A
Continuous Drain Current (T_C = 100°C)		250	A
Continuous Drain Current (T_A = 25°C) *1		50	A
Continuous Drain Current (T_A = 100°C) *1		31	A
Pulsed Drain Current (t_p =10μs, T_C = 25°C)	I_{DM}	1600	A
Single Pulse Avalanche Energy *3	E_{AS}	4000	mJ
Power Dissipation (T_C = 25°C)	P_D	417	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	$R_{\theta JC}$	-	0.21	0.3	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	10	20	°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	100	-	-	V
		V_{GS} = 0V, I_D = 1mA	100	-	-	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = 10V, I_D = 100A	-	1.25	1.38	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2	3	4	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	1.1	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 40V f = 100kHz	-	16370	-	pF
C_{OSS}	Output Capacitance		-	2890	-	
C_{RSS}	Reverse Transfer Capacitance		-	150	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time	V_{DD} = 50V V_{GS} = 15V R_G = 3.3Ω I_D = 50A	-	62	-	ns
t_r	Turn-on Rise Time		-	129	-	
$t_{d(OFF)}$	Turn-Off Delay Time		-	180	-	
t_f	Turn-Off Fall Time		-	42	-	
Q_G	Total Gate-Charge	V_{DD} = 50V V_{GS} = 10V I_D = 100A	-	252	-	nC
Q_{GS}	Gate to Source Charge		-	76	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	66	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = 100A, V_{GS} = 0V	-	0.85	1.2	V
trr	Reverse Recovery Time	I_F = 40A, V_{GS} = 0V dI_F/dt = 100A/μs	-	108	-	ns
Qrr	Reverse Recovery Charge		-	308	-	nC

Notes:

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. The E_{AS} data shows Max. rating. The test condition is V_{DD} = 80V, V_{GS} = 10V, L = 50mH

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

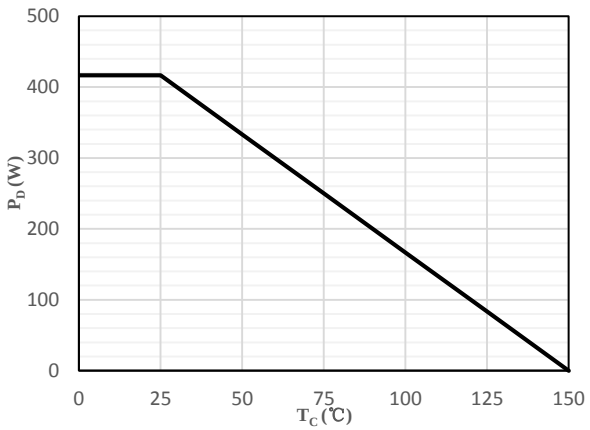


Fig 1 Power Dissipation

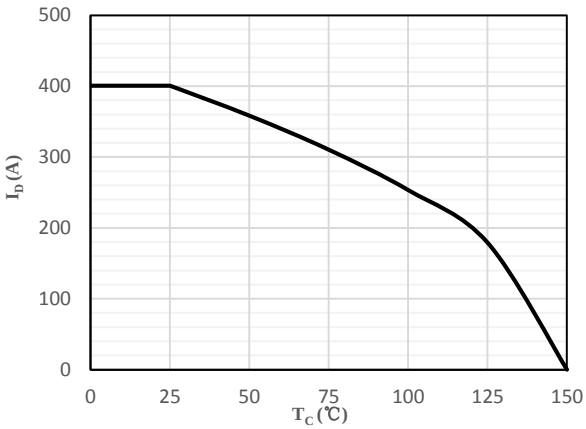


Fig 2 Drain Current

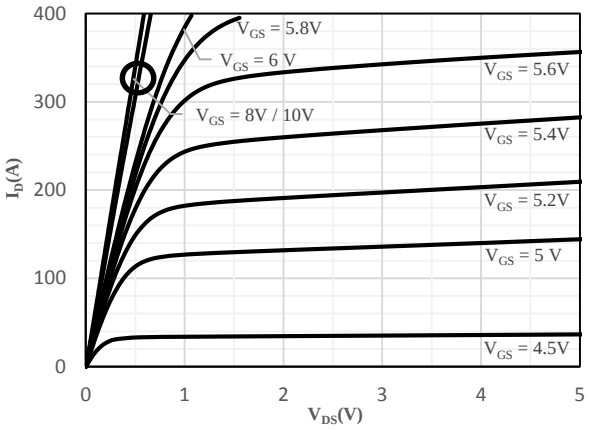


Fig 3 Typical Output Characteristics

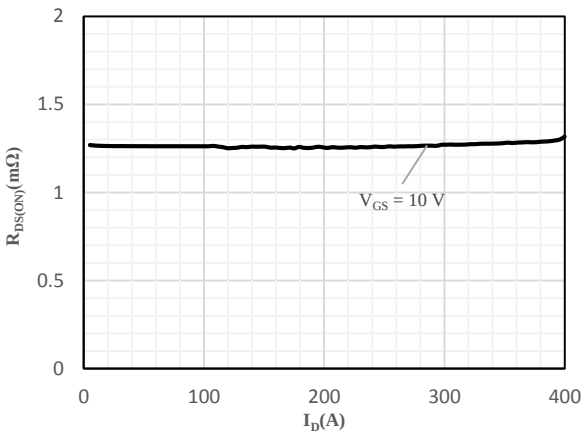


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

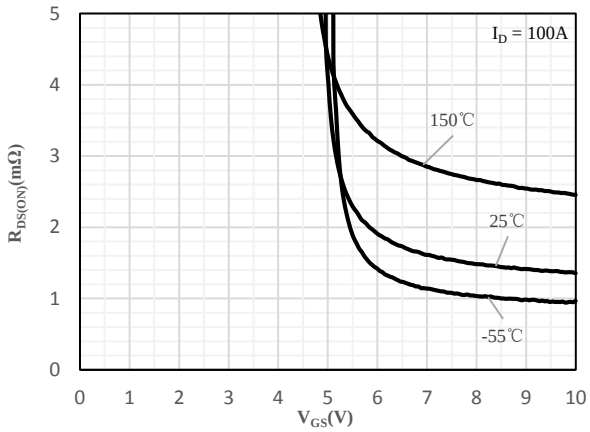


Fig 5 On-Resistance vs. Gate-Source Voltage

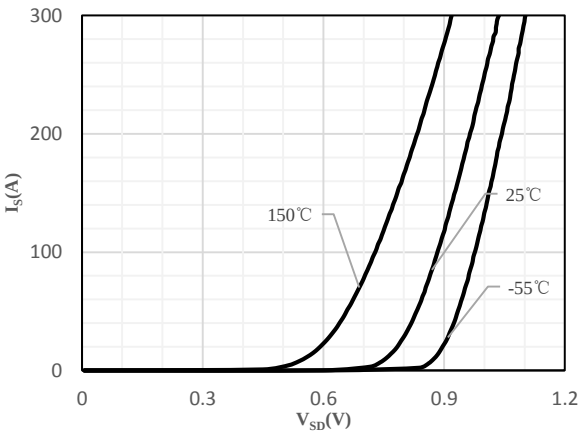


Fig 6 Body-Diode Characteristics

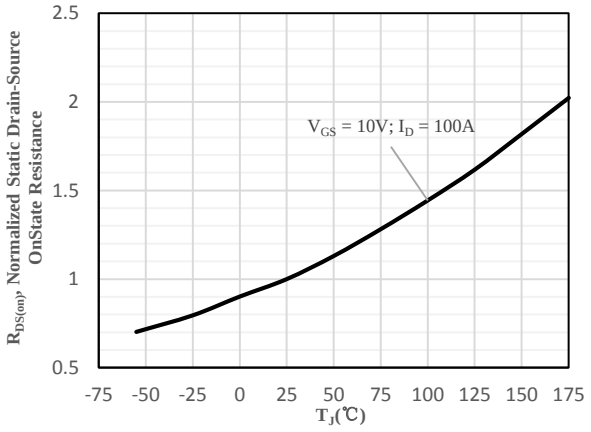


Fig 7 Normalized On-Resistance vs. Junction Temperature

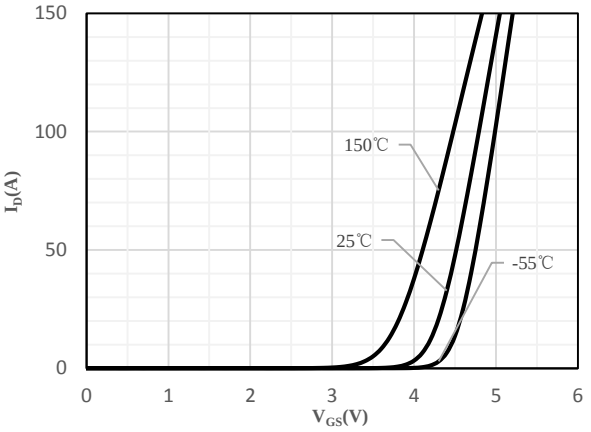


Fig 8 Transfer Characteristics

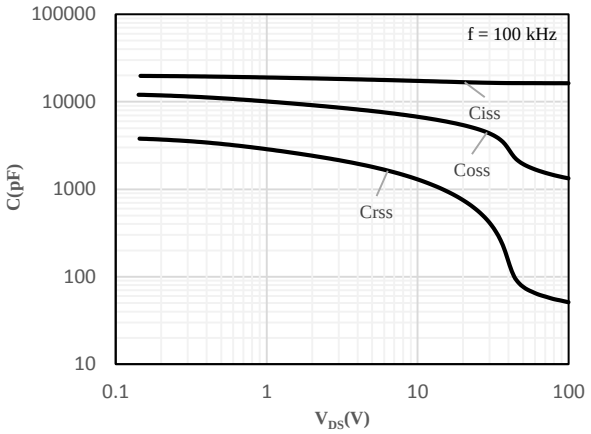


Fig 9 Capacitance Characteristics

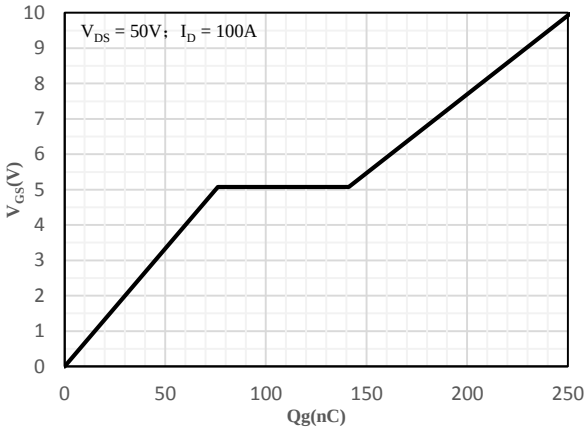


Fig 10 Gate-Charge Characteristics

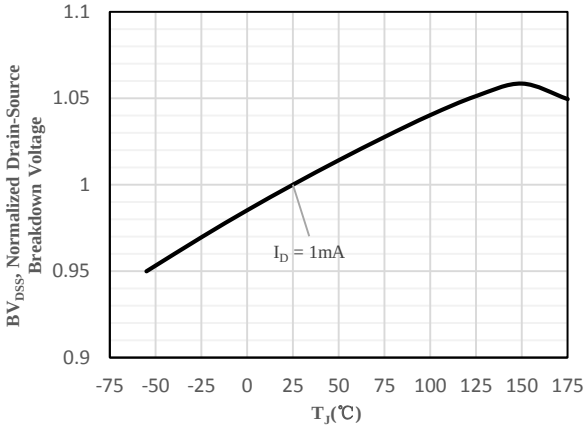


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

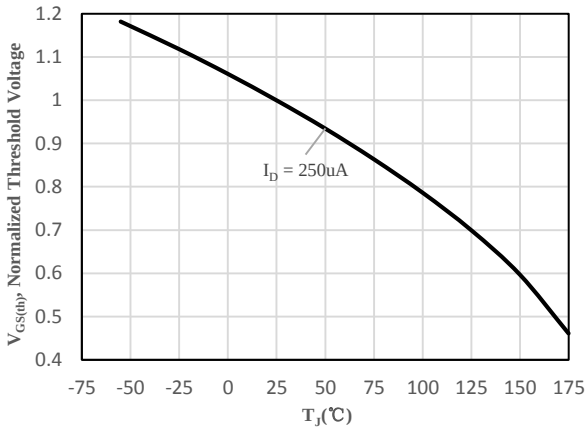


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

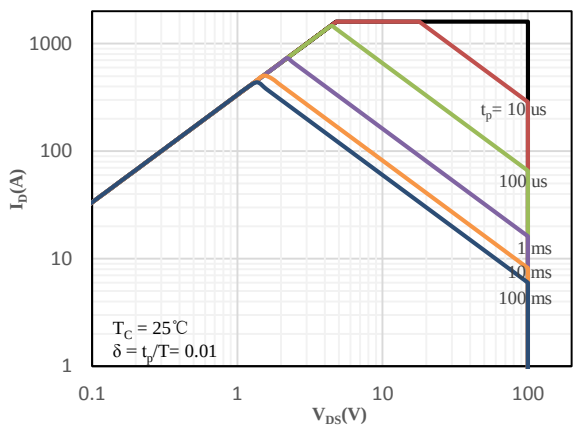


Fig 13 Safe Operating Area

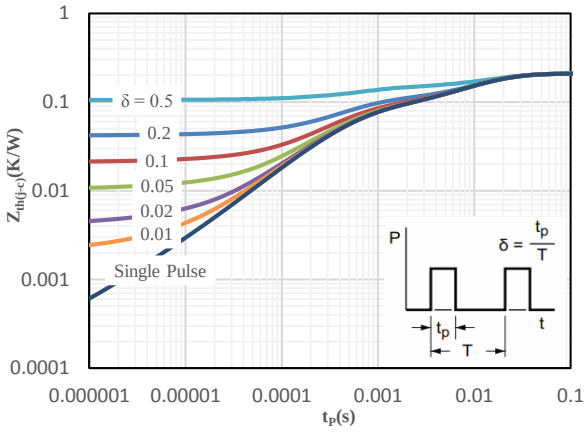
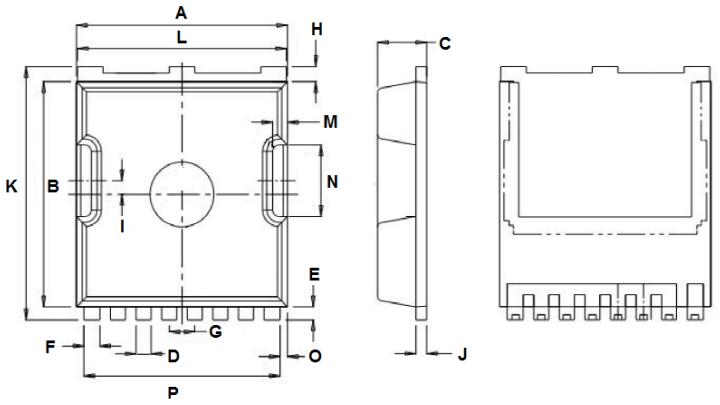


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



TOLL		
Dimension	**Min.**	**Max.**
A	9.70	10.10
B	10.20	10.60
C	2.10	2.50
D	0.60	0.80
E	0.50	0.70
F	0.65	0.85
G	1.10	1.30
H	0.60	0.80
I	0.55	0.75
J	0.45	0.55
K	11.50	11.90
L	9.60	10.00
M	0.50	0.70
N	3.10	3.50
O	0.25	0.45
P	9.00	9.40

SOLDERING FOOTPRINT (Unit: mm)