N-Channel Enhancement Mode Half-Bridge

TBLS04NL050H

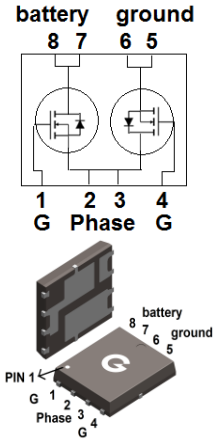
Features

- Half-Bridge
- N-channel Enhancement mode
- High current capacity
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF

Mechanical Data

- Case: DFN5X6HB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



DFN5X6HB

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBLS04NL050H	DFN5X6HB	5000 pcs / Tape & Reel	04NL050H

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	40	V
Gate-to-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current (T_C = 25°C)	I_D	78	A
Continuous Drain Current (T_C = 100°C)		55	
Continuous Drain Current (T_A = 25°C) *1		20	
Continuous Drain Current (T_A = 100°C) *1		14	
Pulsed Drain Current (t_p =10μs, T_C = 25°C)	I_{DM}	312	A
Single Pulse Avalanche Energy (L = 0.5mH)	E_{AS}	65	mJ
Single Pulse Avalanche Energy (L = 0.1mH) *3		40	
Power Dissipation (T_C = 25°C)	P_D	54	W
Power Dissipation (T_A = 25°C) *1		3.8	
Operating Junction Temperature Range	T_J	-55 ~ +175	°C
Storage Temperature Range	T_{STG}	-55 ~ +175	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	-	2.8	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	40	°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	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V, 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 = 20A	-	4.2	5.0	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.4	1.9	2.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	3.7	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 20V f = 300kHz	-	1220	-	pF
C_{OSS}	Output Capacitance		-	450	-	
C_{RSS}	Reverse Transfer Capacitance		-	25	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} = 20V V_{GS} = 10V I_D = 20A R_G = 5Ω	-	7	-	ns
t_r	Turn-on Rise Time *4		-	48	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	30	-	
t_f	Turn-Off Fall Time *4		-	12	-	
Q_G	Total Gate-Charge	V_{DD} = 20V V_{GS} = 10V I_D = 20A	-	19.2	-	nC
Q_{GS}	Gate to Source Charge		-	4	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	3.5	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_S = 20A, V_{GS} = 0V	-	0.83	1.2	V
trr	Reverse Recovery Time	I_S = 20A, V_{GS} = 0V di/dt = 100A/μs	-	57	-	ns
Qrr	Reverse Recovery Charge		-	45	-	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} = 20V, V_{GS} = 10V, L = 0.1mH
4. Guaranteed by design, not subject to production

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

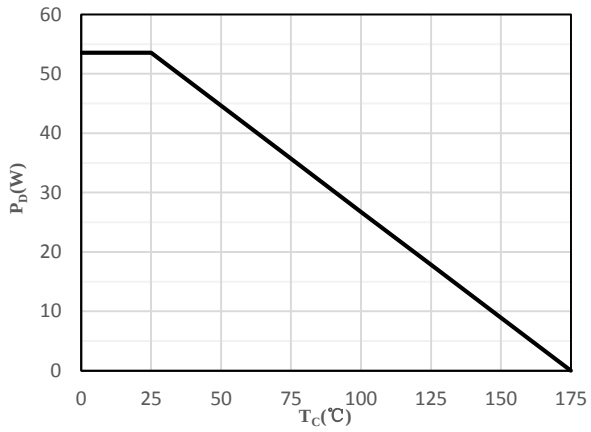


Fig 1 Power Dissipation

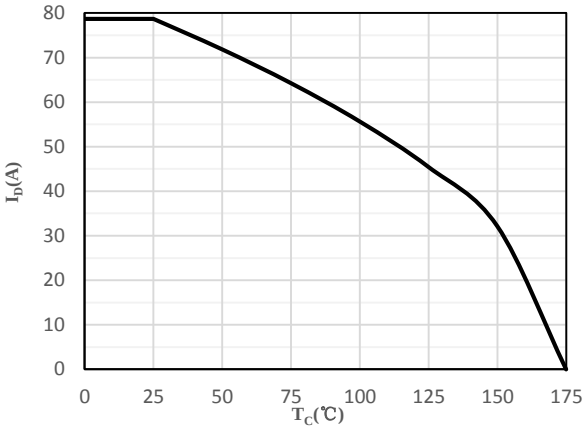


Fig 2 Drain Current

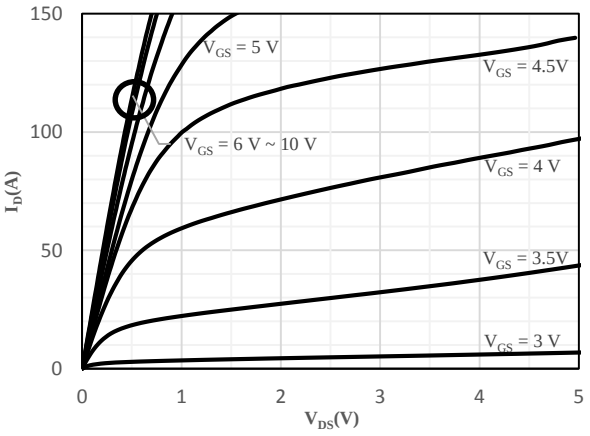


Fig 3 Typical Output Characteristics

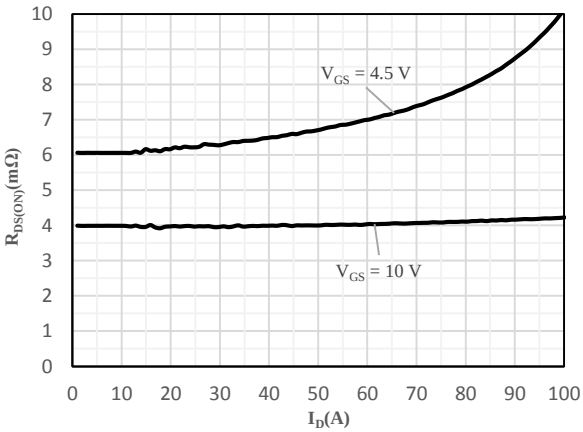


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

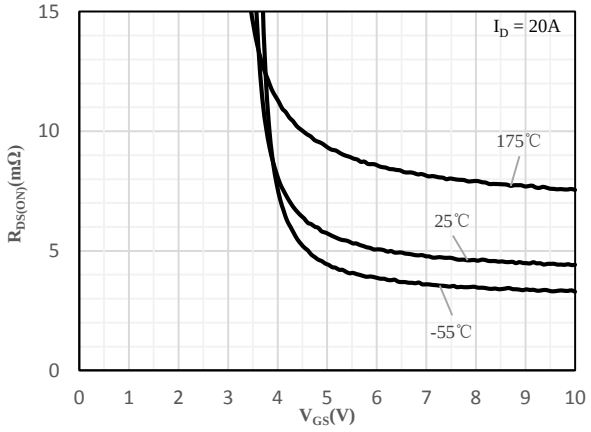


Fig 5 On-Resistance vs. Gate-Source Voltage

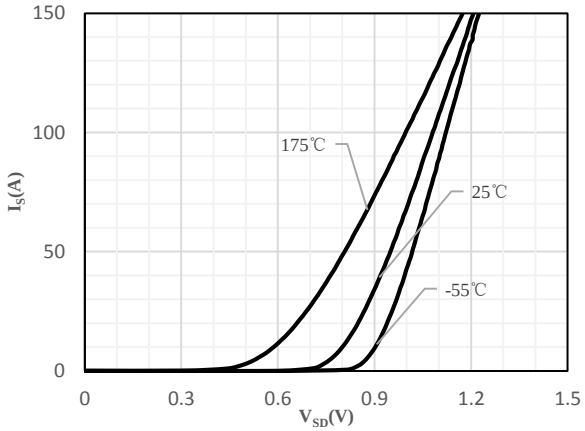


Fig 6 Body-Diode Characteristics

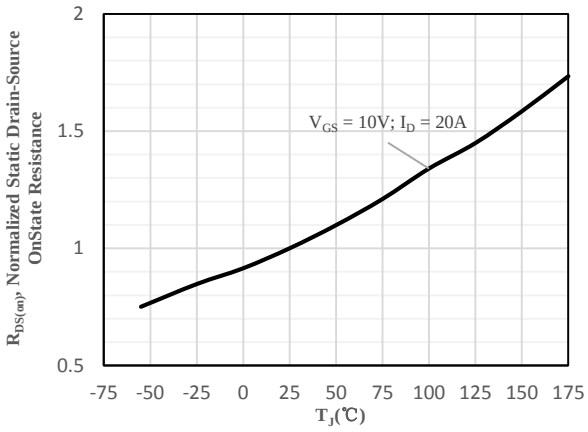


Fig 7 Normalized On-Resistance vs. Junction Temperature

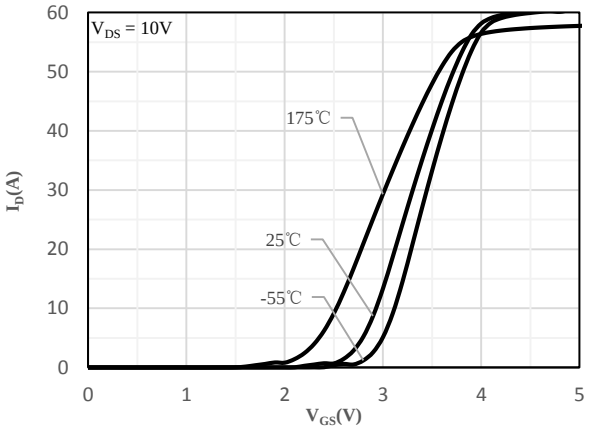


Fig 8 Transfer Characteristics

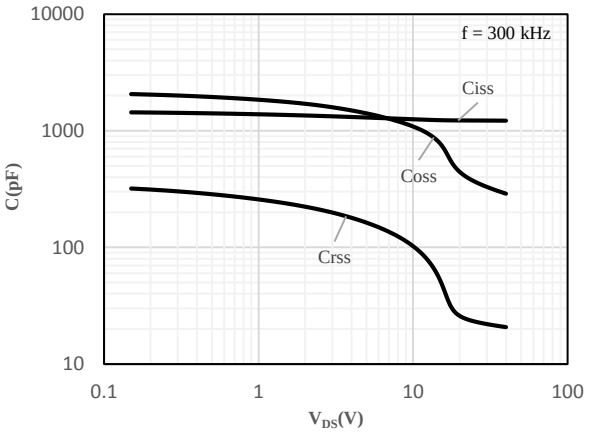


Fig 9 Capacitance Characteristics

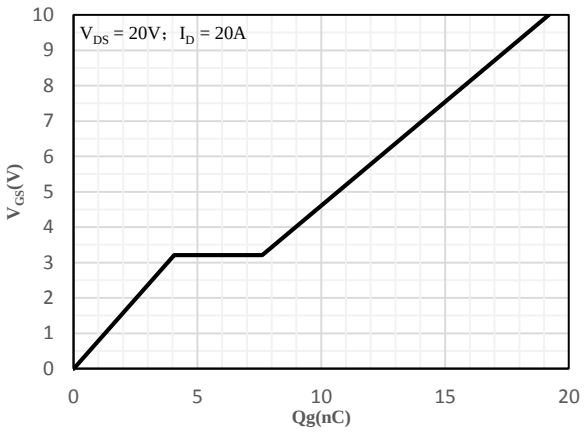


Fig 10 Gate-Charge Characteristics

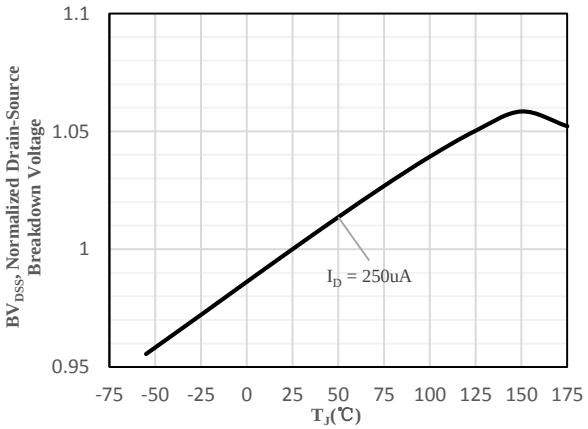


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

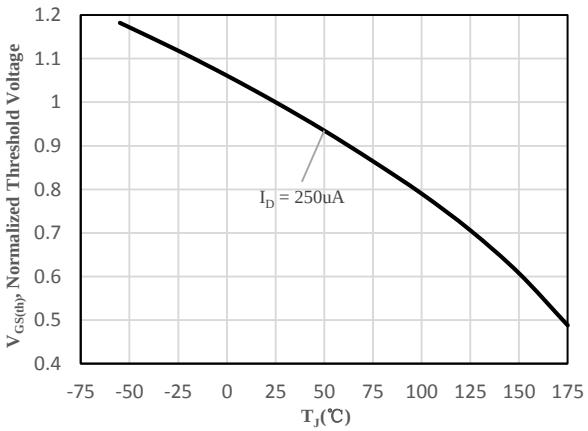
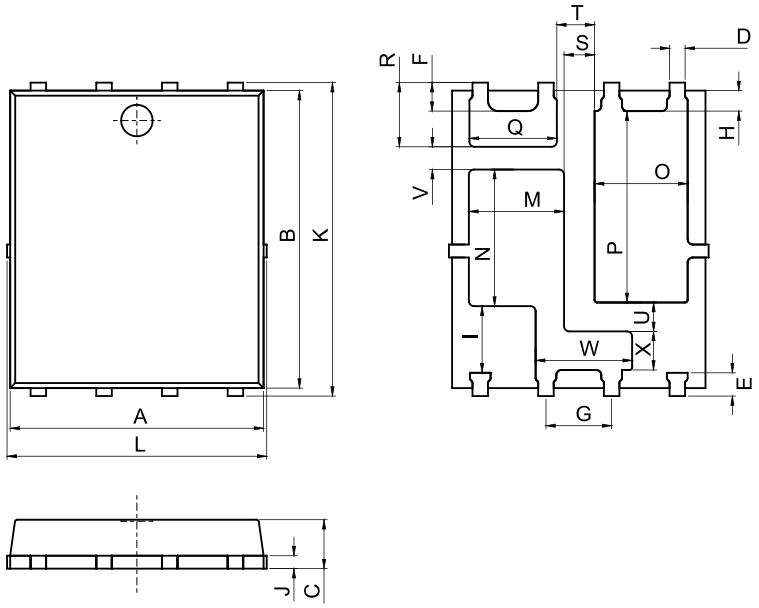


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



DFN5×6HB		
Dimension	**Min.**	**Max.**
A	4.80	5.00
B	5.65	5.85
C	0.90	1.00
D	0.25	0.35
E	0.40	0.50
F	0.50	0.60
G	1.17	1.37
H	0.35	0.45
I	1.19	1.39
J	0.15	0.35
K	5.80	6.20
L	4.80	5.20
M	1.74	1.94
N	2.54	2.74
O	1.70	1.90
P	3.60	3.80
Q	1.64	1.74
R	1.19	1.29
S	0.55	0.65
T	0.68	0.78
U	0.51	0.61
V	0.41	0.51
W	1.82	1.92
X	0.72	0.82

Mounting Pad Layout (Unit: mm)

DFN5×6HB