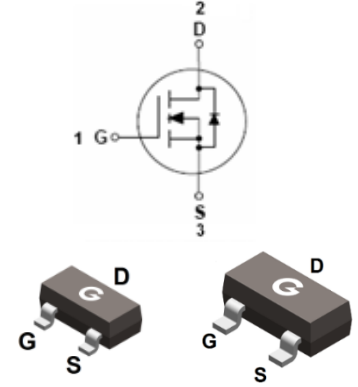


Features

- Advanced trench technology
- Low on-resistance
- Fast switching speed
- Low gate drive
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF



TBL650N06C TBL650N06C-3L

SOT-23

SOT-23-3L

Mechanical Data

- Case: SOT-23, SOT-23-3L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL650N06C	SOT-23	3000 pcs / Tape & Reel	650N06
TBL650N06C-3L	SOT-23-3L	3000 pcs / Tape & Reel	650N06

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	60	V
Gate-to-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (T _C = 25°C)	I _D	4.5	A
Continuous Drain Current (T _A = 25°C) ^{*1}		3.2	
Continuous Drain Current (T _A = 70°C) ^{*1}		2.5	
Pulsed Drain Current (t _p = 10μs, T _A = 25°C)	I _{DM}	20	A
Single Pulse Avalanche Energy ^{*3}	E _{AS}	9	mJ
Power Dissipation (T _C = 25°C)	P _D	2.5	W
Power Dissipation (T _A = 25°C) ^{*1}		1.25	
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 _{θJC}	-	-	50	°C/W
Thermal Resistance Junction-to-Air ^{*1}	R _{θJA}	-	-	100	°C/W

Electrical Characteristics (@ $T_c = 25^\circ\text{C}$ 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	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60V, 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 = 3A	-	55	65	mΩ
		V _{GS} = 4.5V, I _D = 3A	-	72	90	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.6	2.5	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	7.7	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz	-	430	-	pF
C _{OSS}	Output Capacitance		-	28	-	
C _{RSS}	Reverse Transfer Capacitance		-	24	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *4	V _{DD} = 30V V _{GS} = 10V R _G = 1Ω I _D = 1.5A	-	6.5	-	ns
t _r	Turn-on Rise Time *4		-	15.2	-	
t _{d(OFF)}	Turn-Off Delay Time *4		-	15.2	-	
t _f	Turn-Off Fall Time *4		-	10.3	-	
Q _G	Total Gate-Charge (V _{GS} = 4.5V)	V _{DD} = 30V V _{GS} = 10V I _D = 3A	-	4.5	-	nC
	Total Gate-Charge (V _{GS} = 10V)		-	8.8	-	
Q _{GS}	Gate to Source Charge		-	1.3	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	2.1	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = 3A, V _{GS} = 0V	-	0.84	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _F = 3A	-	14	-	ns
Q _{rr}	Reverse Recovery Charge	diF/dt = 100A/μs	-	9	-	nC

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The E_{AS} data shows Max. rating. The test condition is $V_{DD} = 30V, V_{GS} = 10V, L = 0.5mH$
4. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

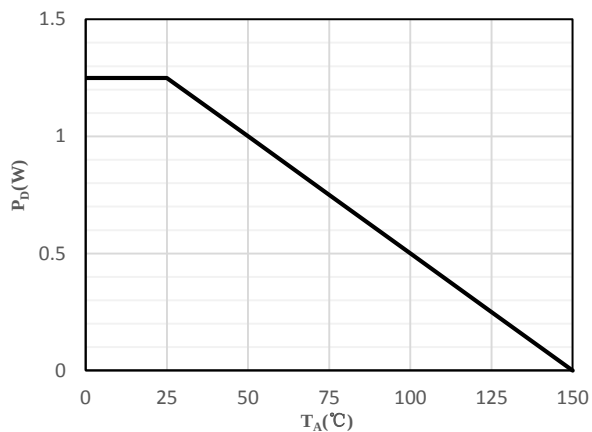


Fig 1 Power Dissipation

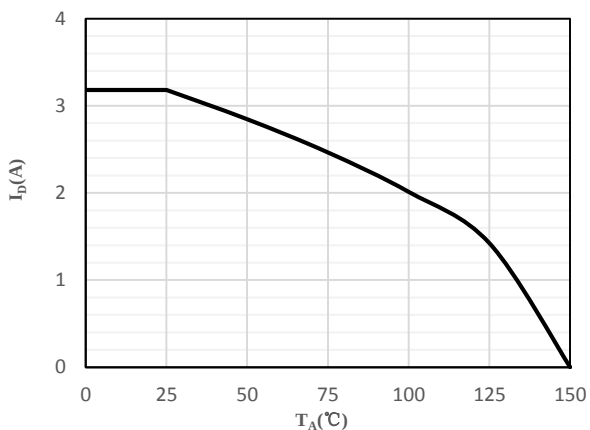


Fig 2 Drain Current

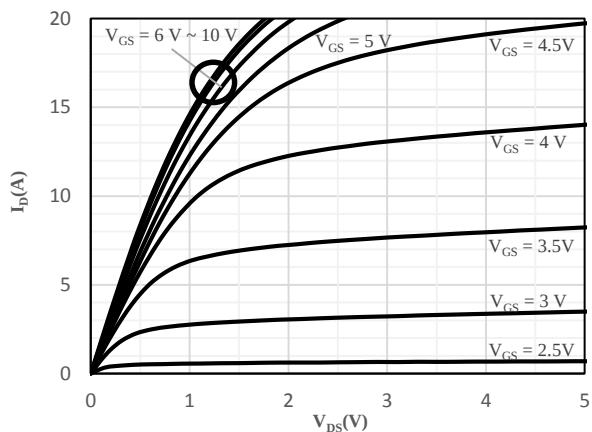
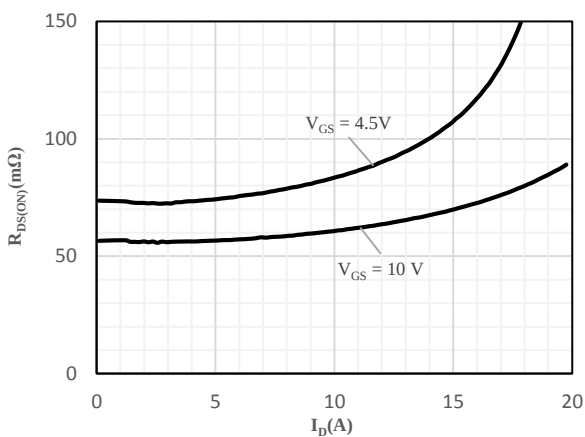


Fig 3 Typical Output Characteristics



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

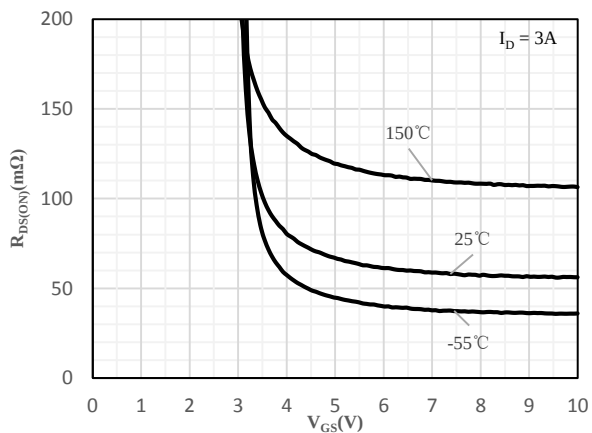


Fig 5 On-Resistance vs. Gate-Source Voltage

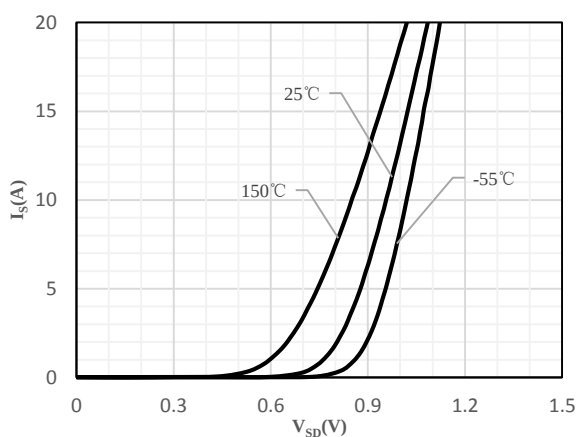


Fig 6 Body-Diode Characteristics

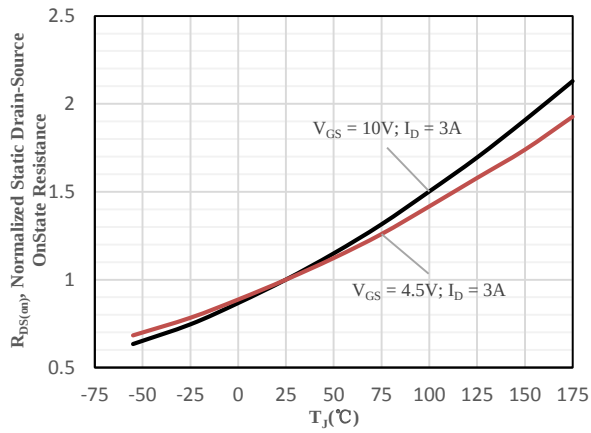


Fig 7 Normalized On-Resistance vs. Junction Temperature

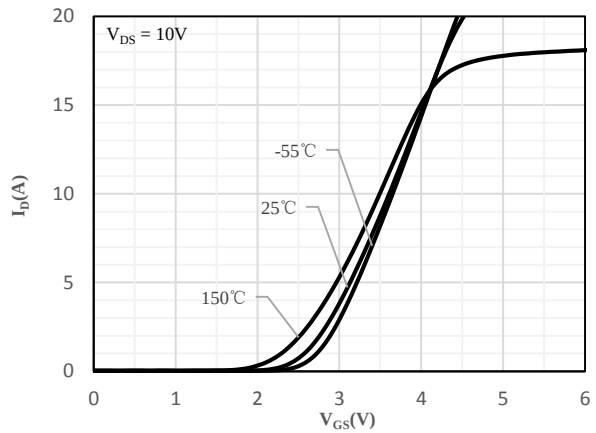


Fig 8 Transfer Characteristics

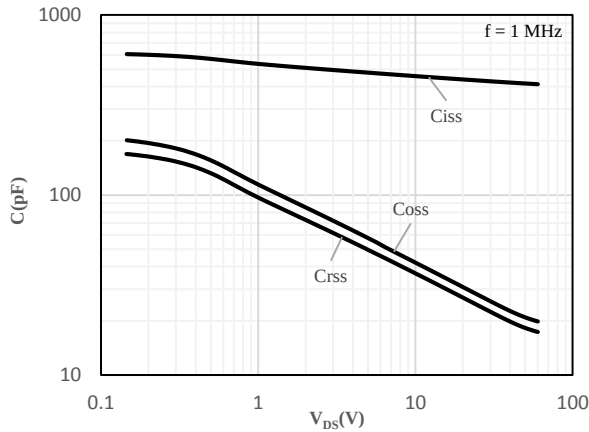


Fig 9 Capacitance Characteristics

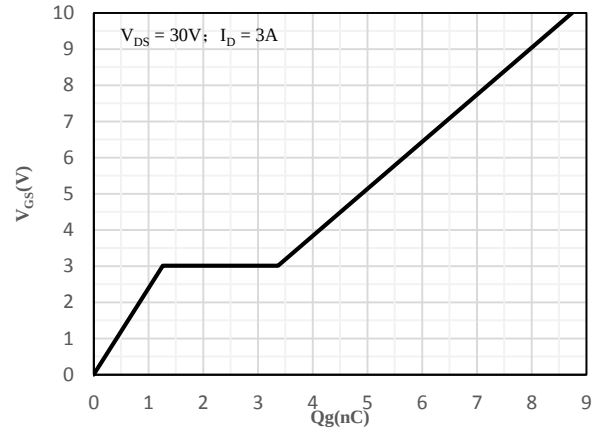


Fig 10 Gate-Charge Characteristics

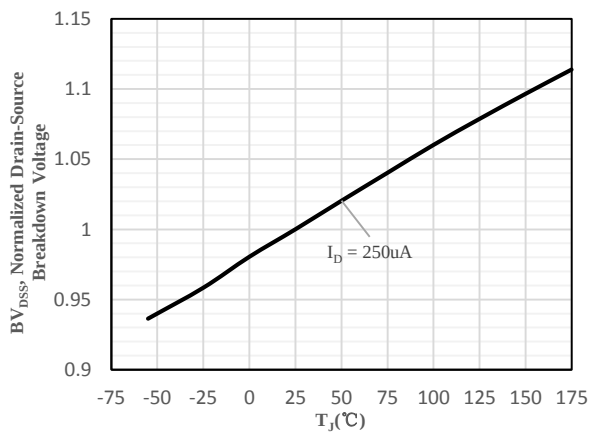


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

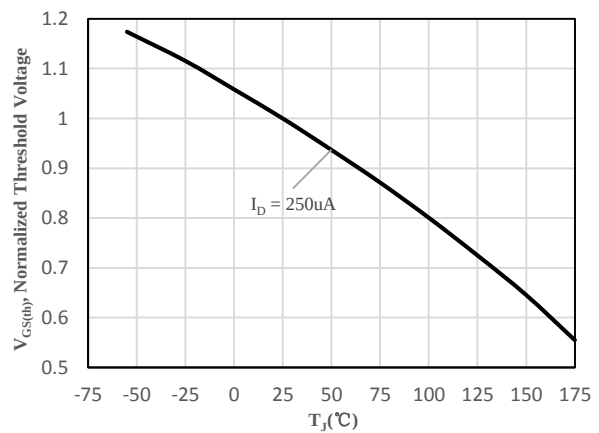


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

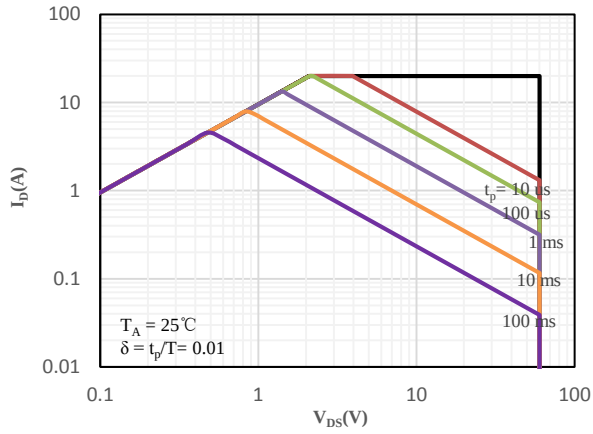


Fig 13 Safe Operating Area

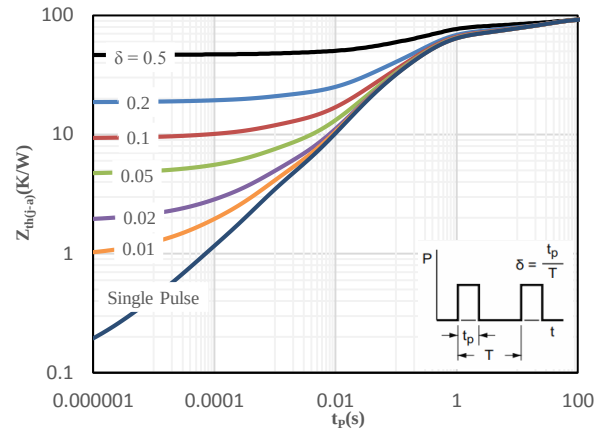
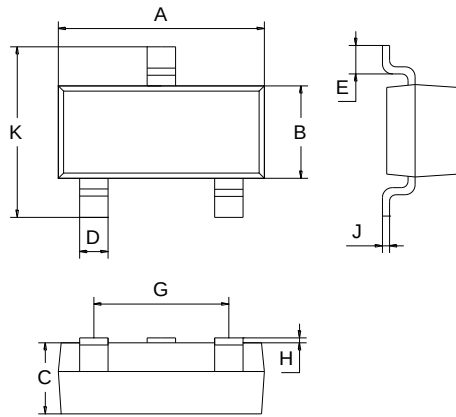
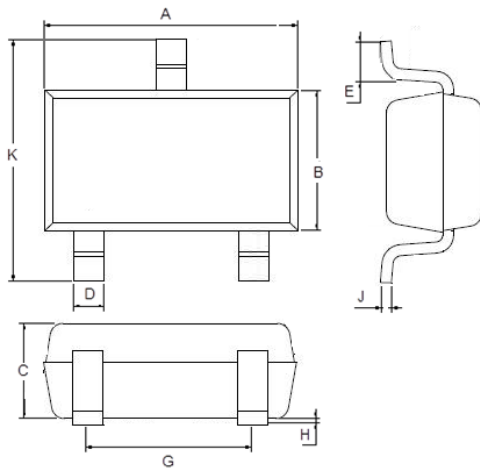


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



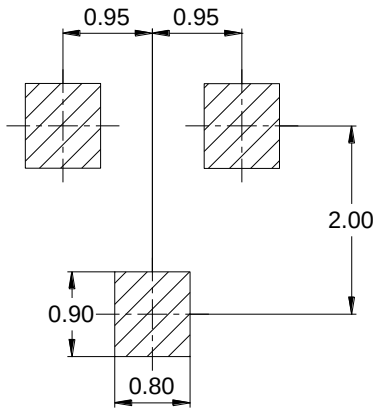
SOT-23		
Dimension	Min.	Max.
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60



SOT-23-3L		
Dimension	Min.	Max.
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
G	1.80	2.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00

Package Outline Dimensions (Unit: mm)

SOT-23



SOT-23-3L

