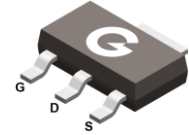
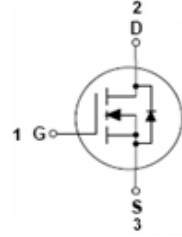


Features

- Advanced trench technology
- Low $R_{DS(on)}$
- Fast switching speed
- HBM: AEC-Q101-001: H1B (JESD22-A114-B: 1B)
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF



SOT-223

Mechanical Data

- Case: SOT-223
- 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
TBL500N06R	SOT-223	4000 pcs / Tape & Reel	500N06R

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	60	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_A = 25^\circ\text{C}$) *1	I_D	6.1	A
Continuous Drain Current ($T_A = 70^\circ\text{C}$) *1		4.9	
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_A = 25^\circ\text{C}$)	I_{DM}	24.4	A
Single Pulse Avalanche Energy *3	E_{AS}	60	mJ
Power Dissipation ($T_A = 25^\circ\text{C}$, $R_{\theta JA} = 32^\circ\text{C/W}$) *1	P_D	3.9	W
Power Dissipation ($T_A = 25^\circ\text{C}$) *1		2.6	
Operating Junction Temperature Range	T_J	$-55 \sim +150$	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	11.5	18	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	32	48	$^\circ\text{C/W}$

Electrical Characteristics (@ $T_A = 25^\circ\text{C}$ 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 = 10A	-	22	50	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.5	3	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	3.5	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V	-	999	-	pF
C _{OSS}	Output Capacitance	V _{DS} = 25V	-	68	-	
C _{RSS}	Reverse Transfer Capacitance	f = 1.0MHz	-	58	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time	V _{DD} = 30V	-	4	-	ns
t _r	Turn-on Rise Time	V _{GS} = 15V	-	67	-	
t _{d(OFF)}	Turn-Off Delay Time	R _G = 3.3Ω	-	34	-	
t _f	Turn-Off Fall Time	I _D = 20A	-	10	-	
Q _G	Total Gate-Charge	V _{DD} = 48V	-	24.5	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = 10V	-	4.8	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = 20A	-	5	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = 20A, V _{GS} = 0V	-	0.9	1.2	V
t _{rr}	Reverse Recovery Time	I _F = 20A, V _{GS} = 0V	-	19	-	ns
Q _{rr}	Reverse Recovery Charge	dI _F /d _t = 100A/us	-	11	-	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 $V_{DD} = 30V, V_{GS} = 10V, L = 10mH$

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

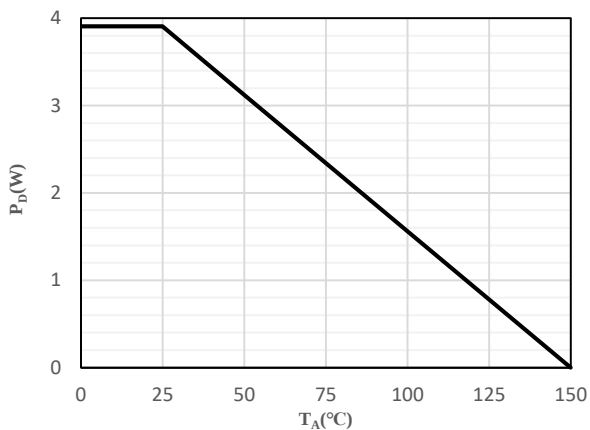


Fig 1 Power Dissipation

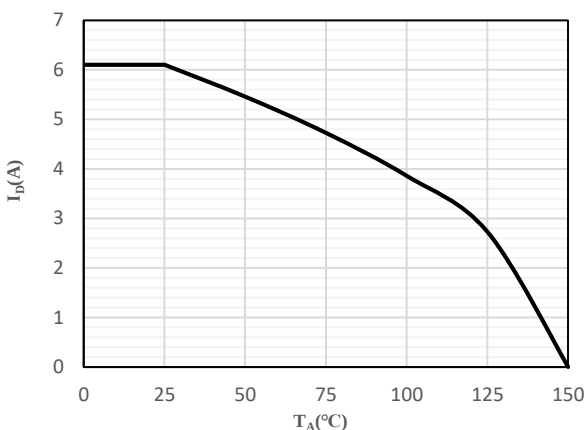


Fig 2 Drain Current

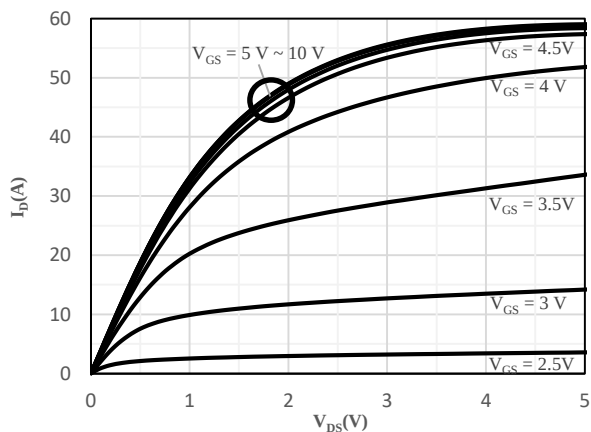


Fig 3 Typical Output Characteristics

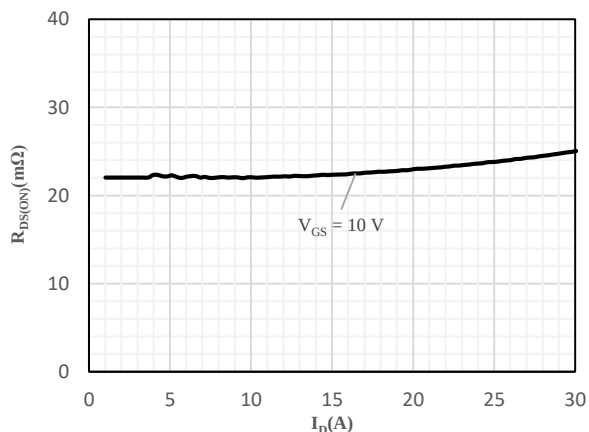


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

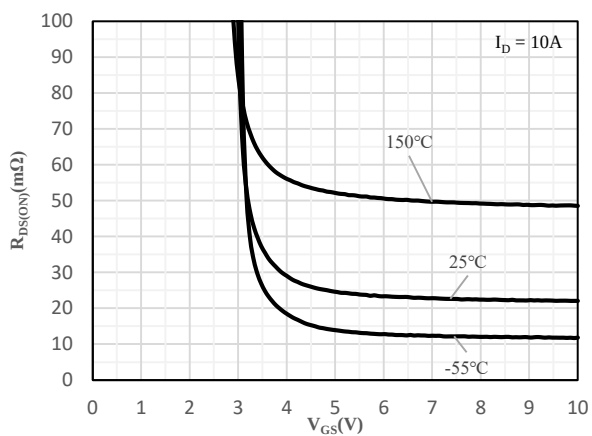


Fig 5 On-Resistance vs. Gate-Source Voltage

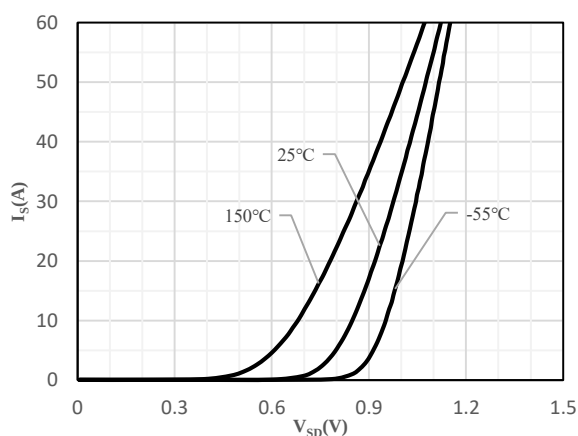


Fig 6 Body-Diode Characteristics

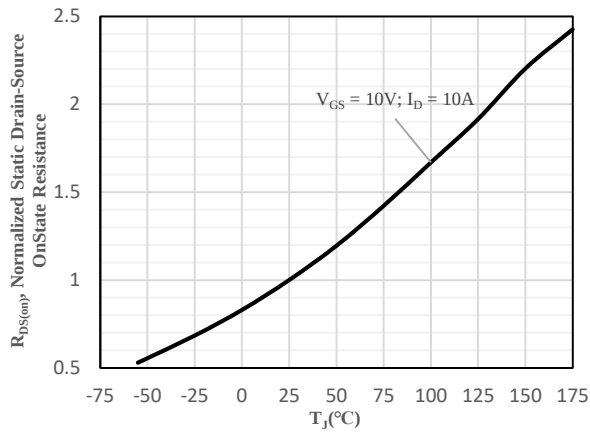


Fig 7 Normalized On-Resistance vs. Junction Temperature

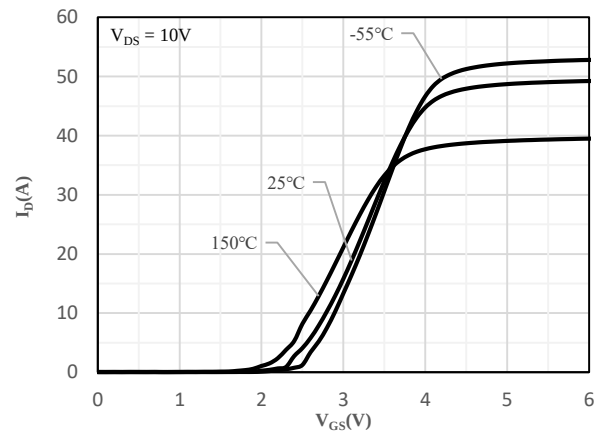


Fig 8 Transfer Characteristics

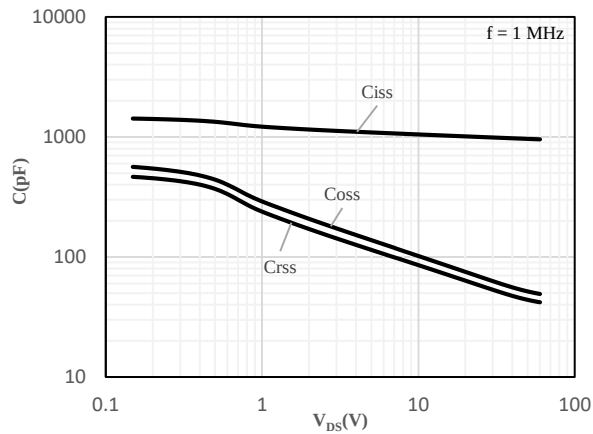


Fig 9 Capacitance Characteristics

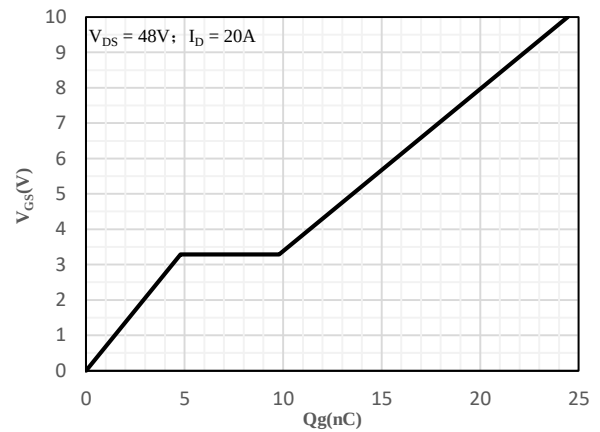


Fig 10 Gate-Charge Characteristics

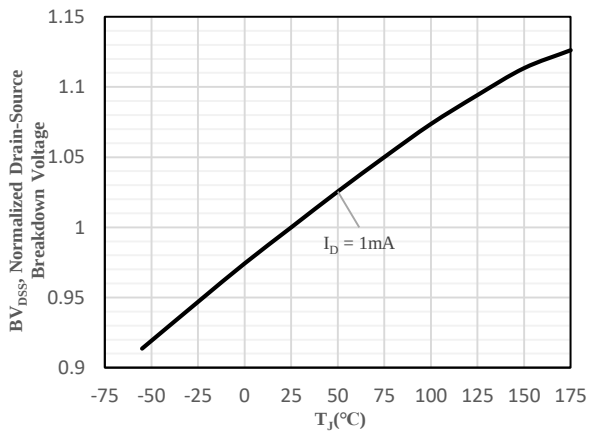


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

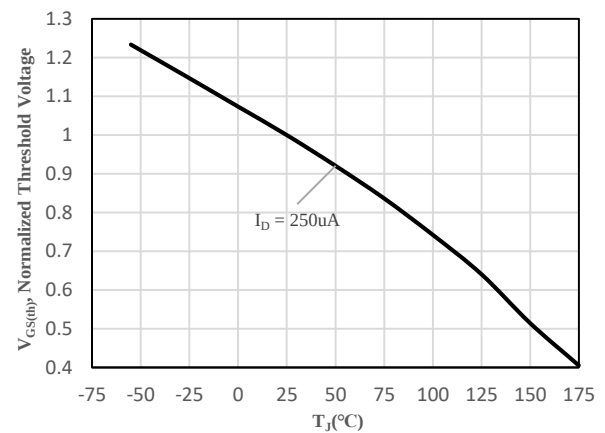


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

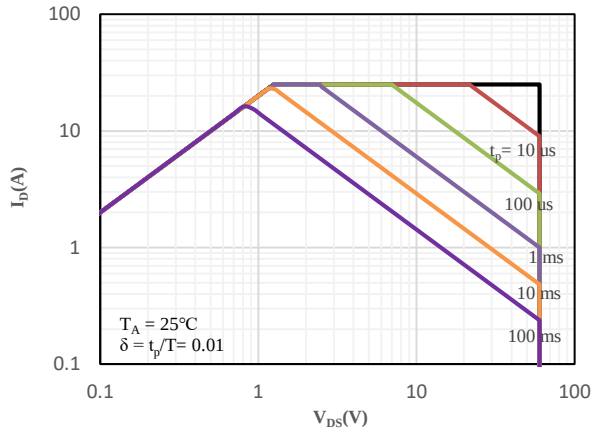


Fig 13 Safe Operating Area

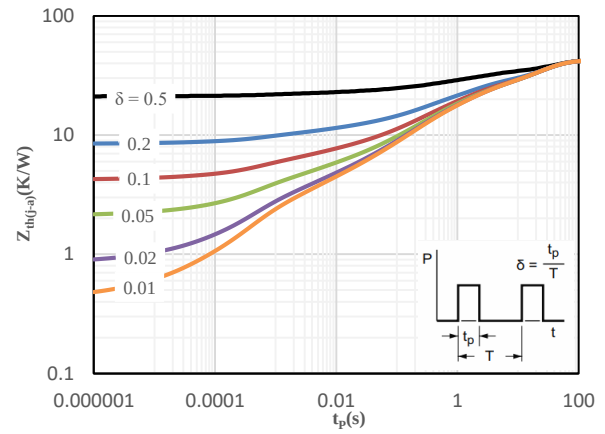
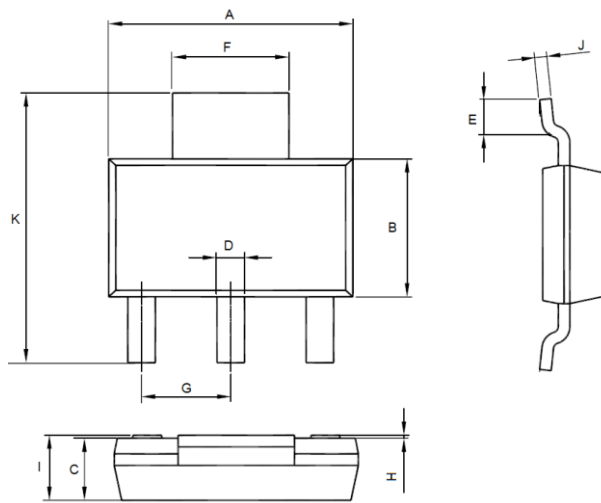


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



SOT-223		
Dimension	Min.	Max.
A	6.10	6.50
B	3.30	3.70
C	1.50	1.70
D	0.66	0.82
E	0.90	1.15
F	2.90	3.10
G	2.20	2.40
H	0.02	0.10
I	1.52	1.80
J	0.20	0.40
K	6.70	7.30

Mounting Pad Layout (Unit: mm)

SOT-223

