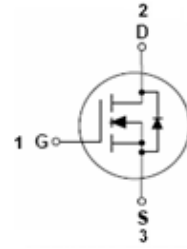


Features

- Advanced trench technology
- Fast switching speed
- Green device available
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF

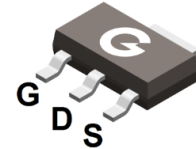


Applications

- Synchronous Rectification
- Motor Control
- Portable equipment application

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



SOT-223

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL990N10R	SOT-223	4000 pcs / Tape & Reel	990N10R

Maximum Ratings (@ T_A = 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	6.6	A
Continuous Drain Current (T _A = 25°C) *1		3	A
Continuous Drain Current (T _A = 100°C) *1		1.9	A
Pulsed Drain Current (t _p = 10μs, T _A = 25°C)	I _{DM}	30	A
Single Pulse Avalanche Energy *3	E _{AS}	15	mJ
Power Dissipation (T _C = 25°C)	P _D	10	W
Power Dissipation (T _A = 25°C) *1		2.1	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 _{θJC}	-	-	12	°C/W
Thermal Resistance Junction-to-Air *1	R _{θJA}	-	-	60	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	100	-	-	V
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 = 5A	-	82	99	mΩ
		V _{GS} = 4.5V, I _D = 3A	-	86	120	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.5	2.5	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	3.5	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz	-	1010	-	pF
C _{OSS}	Output Capacitance		-	36	-	
C _{RSS}	Reverse Transfer Capacitance		-	31	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *4	V _{DD} = 50V I _D = 5A R _G = 5Ω	-	9	-	ns
t _r	Turn-on Rise Time *4		-	13	-	
t _{d(OFF)}	Turn-Off Delay Time *4		-	22	-	
t _f	Turn-Off Fall Time *4		-	7.5	-	
Q _G	Total Gate-Charge	V _{DD} = 50V	-	24.5	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = 10V	-	2.4	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = 5A	-	5.5	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = 5A, V _{GS} = 0V	-	0.84	1.2	V
t _{rr}	Reverse Recovery Time	I _S = 5A, V _{GS} = 0V	-	34	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100A/μs	-	39	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper
- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The E_{AS} data shows Max. rating. The test condition is $V_{DD} = 50V, V_{GS} = 10V, L = 0.5mH$
- Guaranteed by design, not subject to production

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

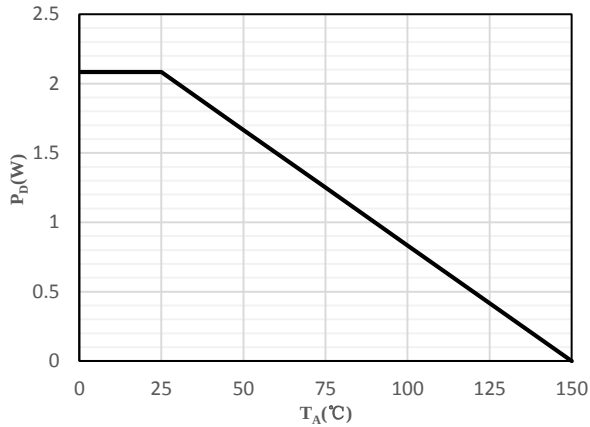


Fig 1 Power Dissipation

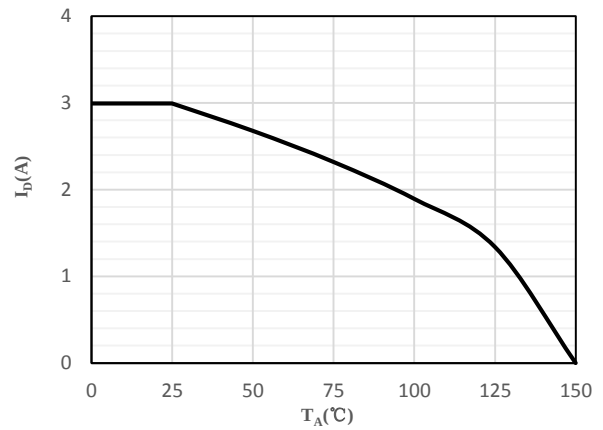


Fig 2 Drain Current

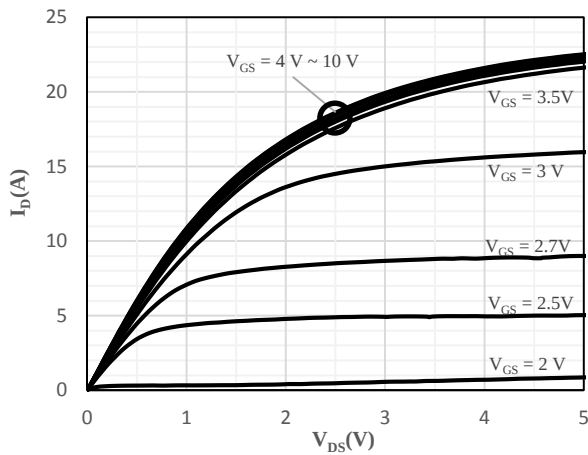


Fig 3 Typical Output Characteristics

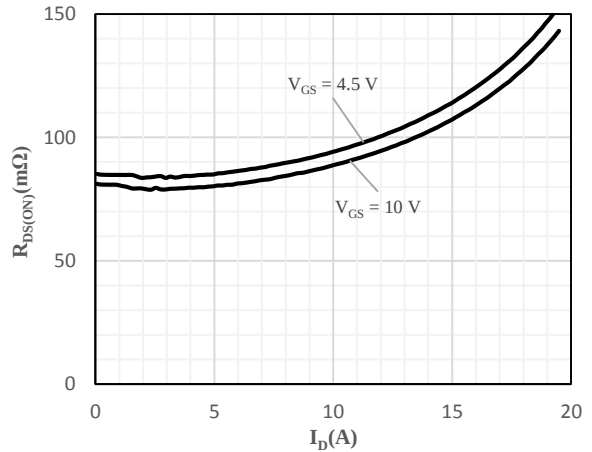


Fig 4 On-Resistance vs. Drain Current
and Gate Voltage

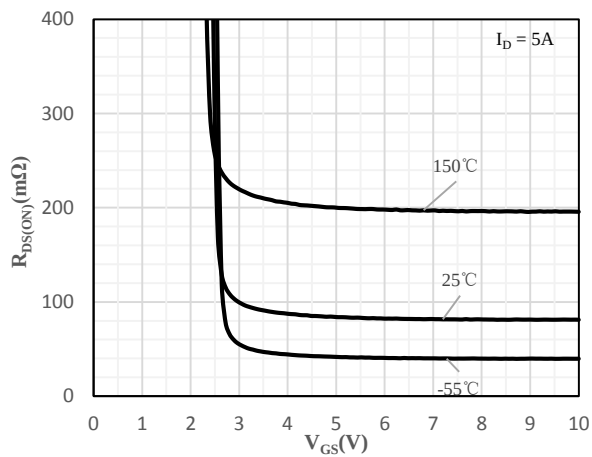


Fig 5 On-Resistance vs. Gate-Source Voltage

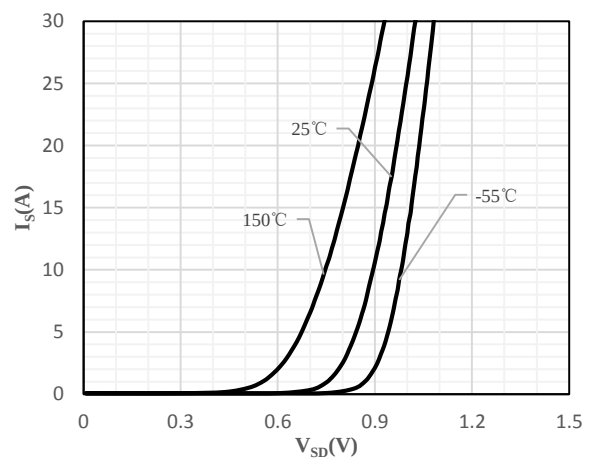


Fig 6 Body-Diode Characteristics

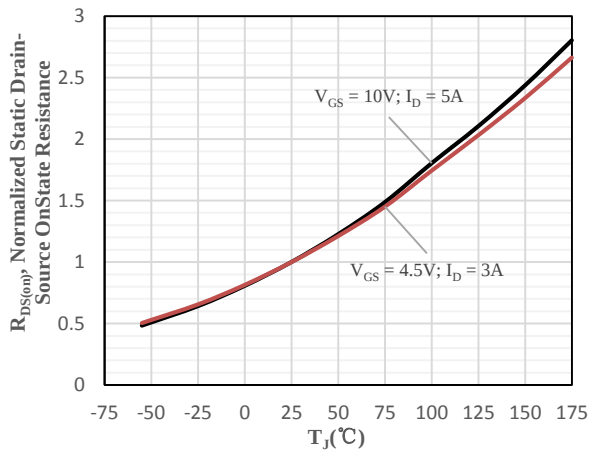


Fig 7 Normalized On-Resistance vs. Junction Temperature

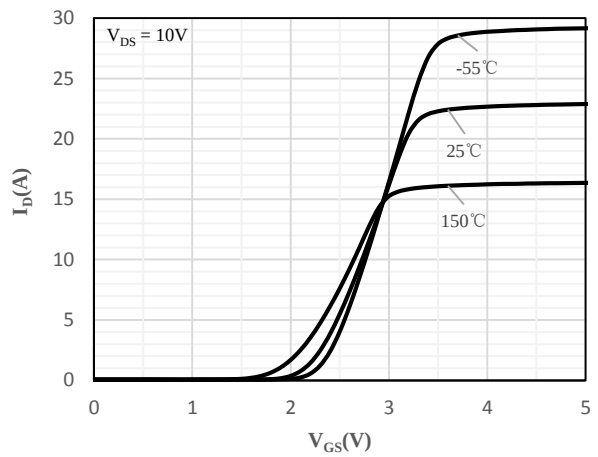


Fig 8 Transfer Characteristics

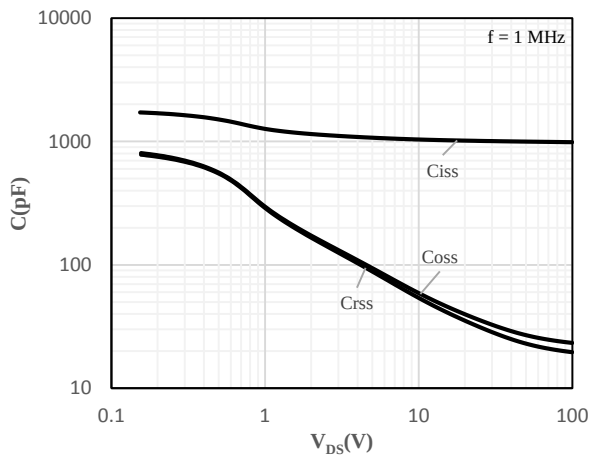


Fig 9 Capacitance Characteristics

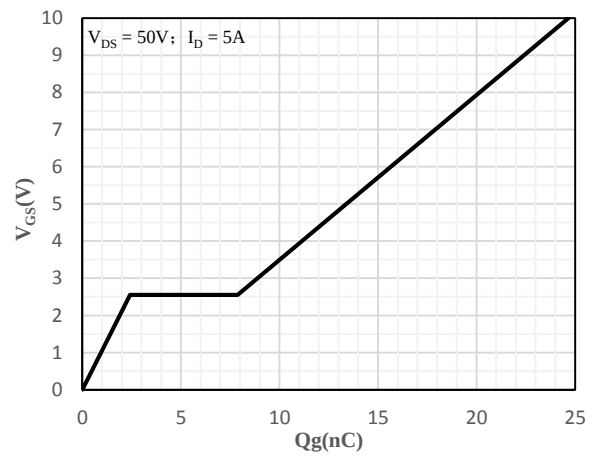


Fig 10 Gate-Charge Characteristics

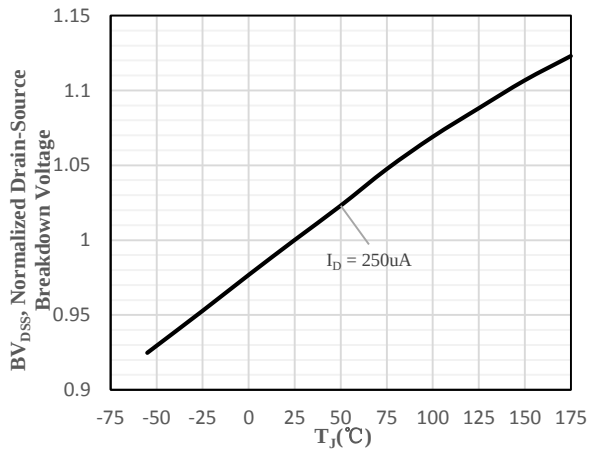


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

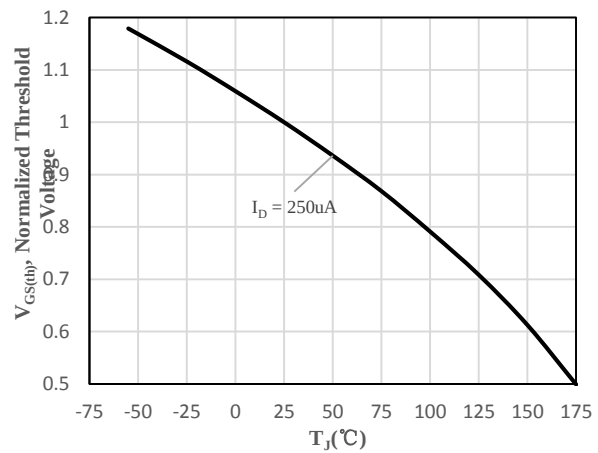


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

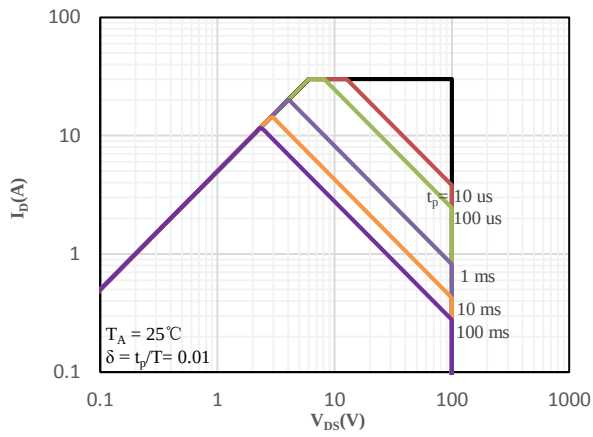


Fig 13 Safe Operating Area

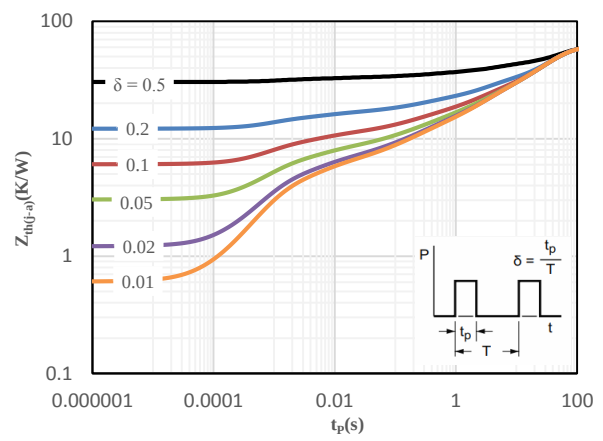
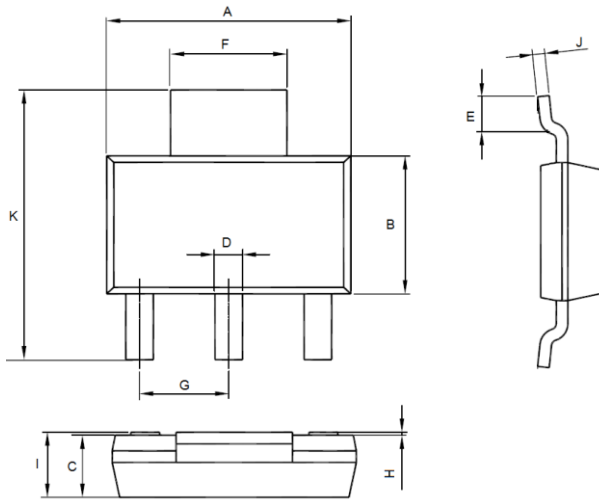


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



SOT-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

