N-Channel Enhancement Mode MOSFET

TBL03N10TR

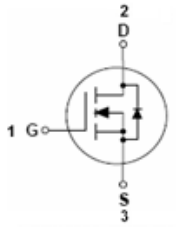
Features

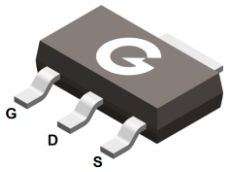
- Advanced SGT technology
- Low $R_{DS(ON)}$ × Q_G FOM
- Extremely low switching loss
- Excellent stability and uniformity
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF

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
TBL03N10TR	SOT-223	4000 pcs / Tape & Reel	03N10T

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	3	A
Continuous Drain Current (T_A = 25°C) *1		2.6	
Continuous Drain Current (T_A = 70°C) *1		2.1	
Pulsed Drain Current (t_p =10μs, T_A = 25°C)	I_{DM}	20	A
Single Pulse Avalanche Energy *3	E_{AS}	0.1	mJ
Power Dissipation (T_C = 25°C)	P_D	4.2	W
Power Dissipation (T_A = 25°C) *1		1.8	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	$R_{\theta JC}$	-	-	30	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	70	°C/W

Electrical Characteristics (@ T_C = 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
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80V, 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	-	105	140	mΩ
		V_{GS} = 4.5V, I_D = 2A	-	135	180	
$V_{GS(th)}$	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	-	6	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 50V f = 1MHz	-	143	-	pF
C_{OSS}	Output Capacitance		-	50	-	
C_{RSS}	Reverse Transfer Capacitance		-	2.8	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} = 50V V_{GS} = 10V R_G = 2Ω I_D = 3A	-	13.2	-	ns
t_r	Turn-on Rise Time *4		-	2.2	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	11	-	
t_f	Turn-Off Fall Time *4		-	1.1	-	
Q_G	Total Gate-Charge (V_{GS} = 4.5V)	V_{DD} = 50V V_{GS} = 10V I_D = 3A	-	3	-	nC
	Total Gate-Charge (V_{GS} = 10V)		-	6	-	
Q_{GS}	Gate to Source Charge		-	1.4	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.8	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = 3A, V_{GS} = 0V	-	0.9	1.0	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_F = 3A d_{iF}/d_t = 100A/μs	-	30	-	ns
Q_{rr}	Reverse Recovery Charge		-	24	-	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} = 50V, 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)

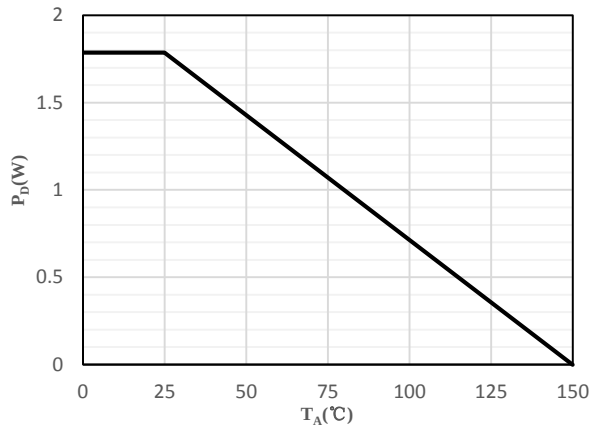


Fig 1 Power Dissipation

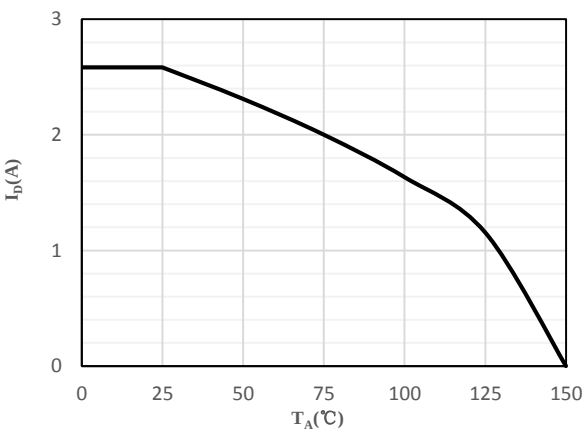


Fig 2 Drain Current

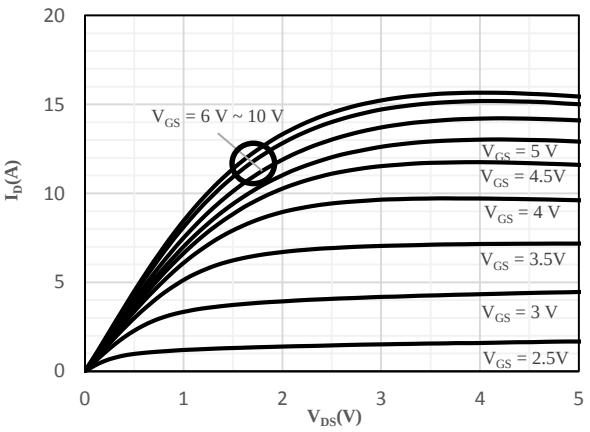


Fig 3 Typical Output Characteristics

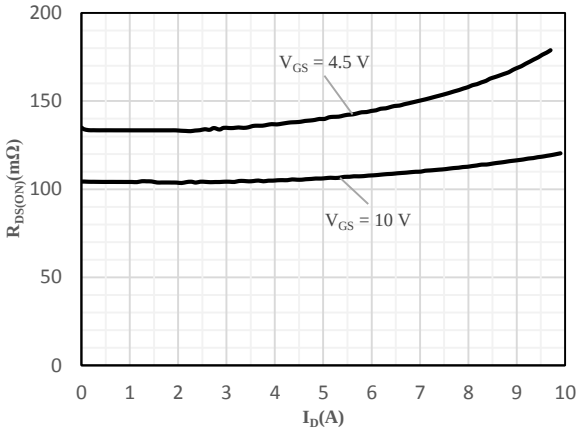


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

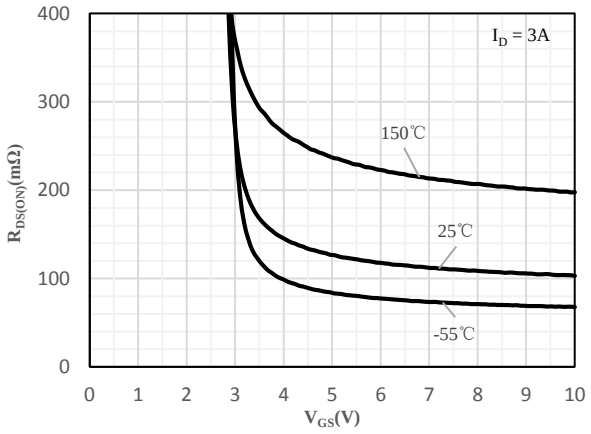


Fig 5 On-Resistance vs. Gate-Source Voltage

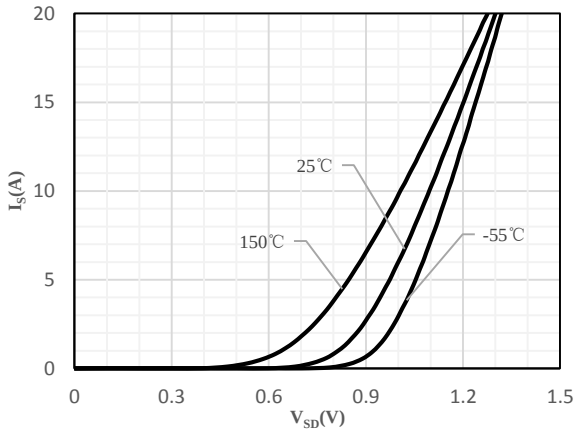


Fig 6 Body-Diode Characteristics

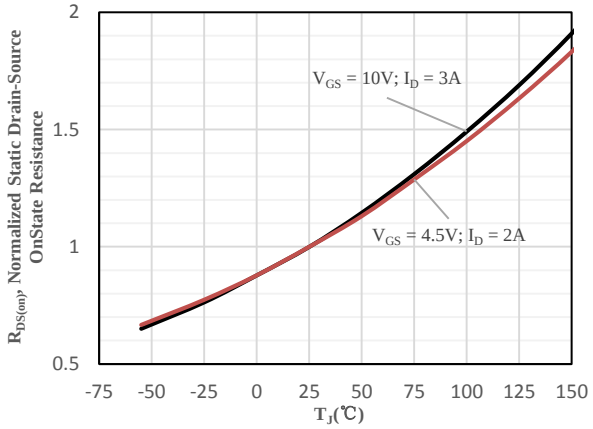


Fig 7 Normalized On-Resistance vs. Junction Temperature

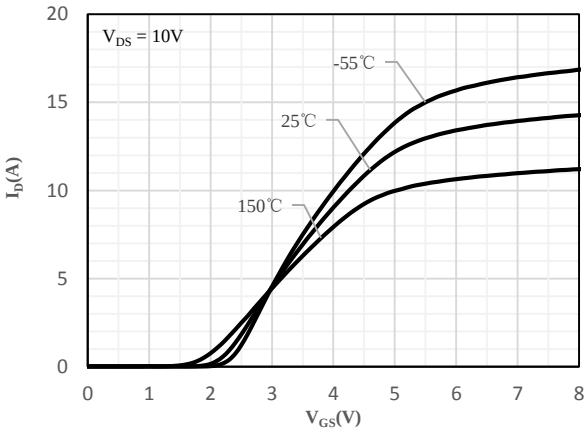


Fig 8 Transfer Characteristics

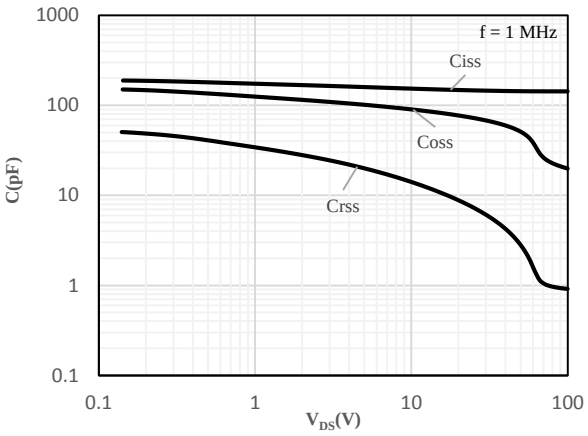


Fig 9 Capacitance Characteristics

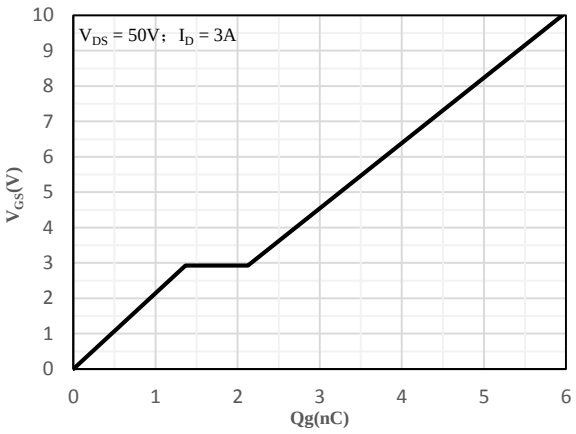


Fig 10 Gate-Charge Characteristics

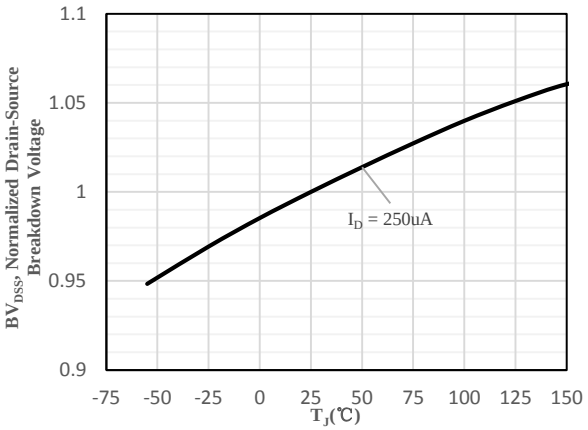


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

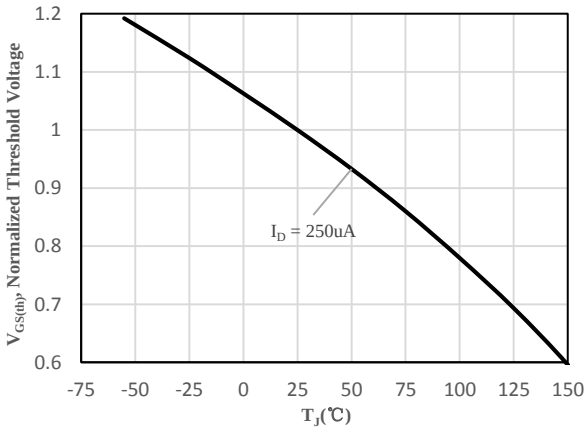


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

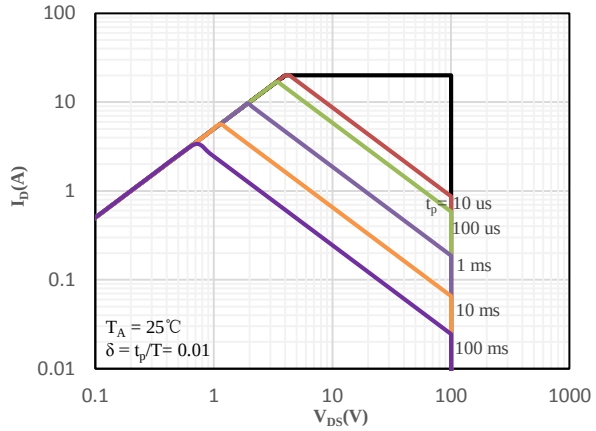


Fig 13 Safe Operating Area

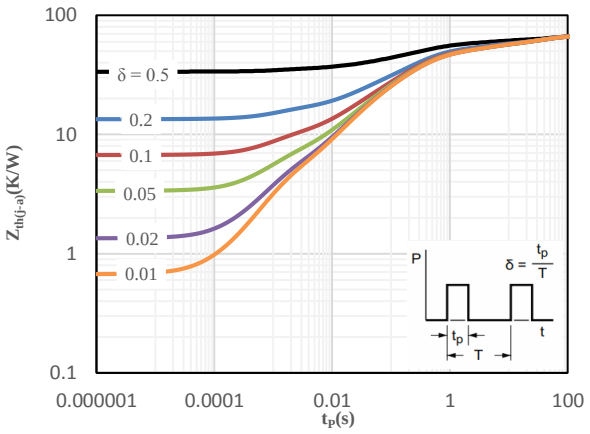
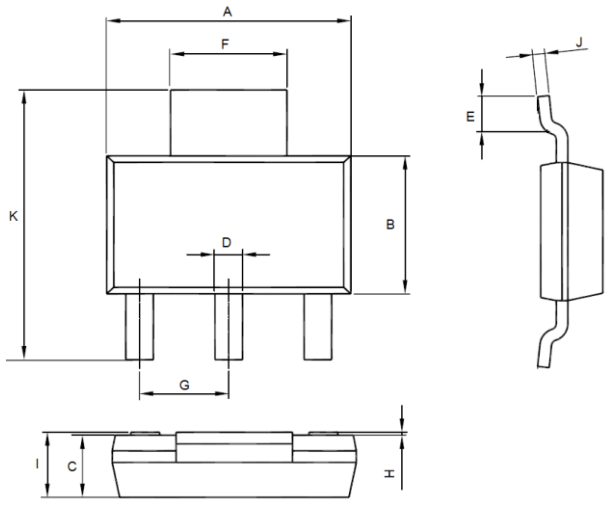


Fig 14 Maximum transient thermal impedance

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

