N-Channel Enhancement Mode MOSFET

TBL170N10TD

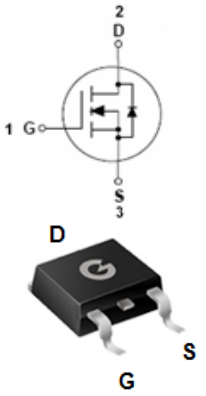
Features

HF

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Halogen free
- Qualified to AEC-Q101 standards for high reliability

Mechanical Data

- Case: TO-252
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TO-252

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL170N10TD	TO-252	80 pcs / Tube & 2500 pcs / Tape & Reel	170N10TD

Maximum Ratings (@ T_C = 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) *5	I_D	50	A
Continuous Drain Current (T_C = 100°C) *5	I_D	32	A
Continuous Drain Current (T_A = 25°C)	I_D	8	A
Continuous Drain Current (T_A = 100°C)	I_D	5	A
Pulsed Drain Current *3	I_{DM}	180	A
Single Pulse Avalanche Energy *3, 6	E_{AS}	11	mJ

Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation (T_C = 25°C) *2	P_D	83	W
Thermal Resistance Junction-to-Air *1, 4	$R_{\theta JA}$	55	°C/W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	1.5	°C/W
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

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
$R_{DS(ON)}$	Static Drain-Source On-resistance	V_{GS} = 10V, I_D = 20A	-	14	17	mΩ
		V_{GS} = 4.5V, I_D = 10A	-	19	25	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.2	1.8	2.5	V
R_G	Gate Resistance	V_{DS} = V_{GS} =0V, f=1MHz	-	2.7	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1.0MHz	-	1102	-	pF
C_{OSS}	Output Capacitance		-	537	-	
C_{RSS}	Reverse Transfer Capacitance		-	39	-	
Q_G	Total Gate-Charge	V_{DS} = 80V V_{GS} = 10V I_D = 15A	-	25	-	nC
Q_{GS}	Gate to Source Charge		-	6.4	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	5.6	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time	V_{DS} = 50V V_{GS} = 10V R_G = 3.3Ω I_D = 40A	-	44	-	ns
t_r	Turn-on Rise Time		-	51	-	
$t_{d(OFF)}$	Turn-Off Delay Time		-	253	-	
t_f	Turn-Off Fall Time		-	112	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_{SD} = 15A, V_{GS} = 0V	-	0.88	1.0	V
trr	Reverse Recovery Time	I_{SD} = 15A, V_R=30V dI_{SD}/d_t = 100A/μs	-	45	-	ns
Qrr	Reverse Recovery Charge		-	50	-	nC

Notes:

1、 The value of $R_{\theta JC}$ is measured in a still air environment with T_A =25°C and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design

2、 The power dissipation P_D is based on $T_{J(MAX)}$ = 150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used

3、 Single pulse width limited by junction temperature $T_{J(MAX)}$ = 150°C

4、 The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient

5、 The maximum current rating is package limited

6、 The E_{AS} data shows Max. rating. The test condition is V_{DS} = 50V, V_{GS} = 10V, L = 0.5mH, I_{AS} = 6A

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

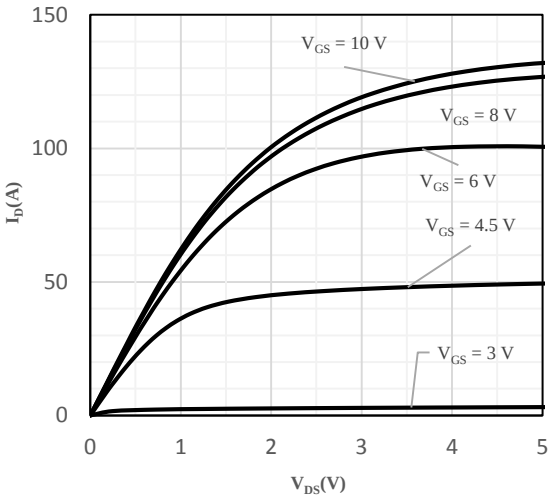


Fig 1 Typical Output Characteristics

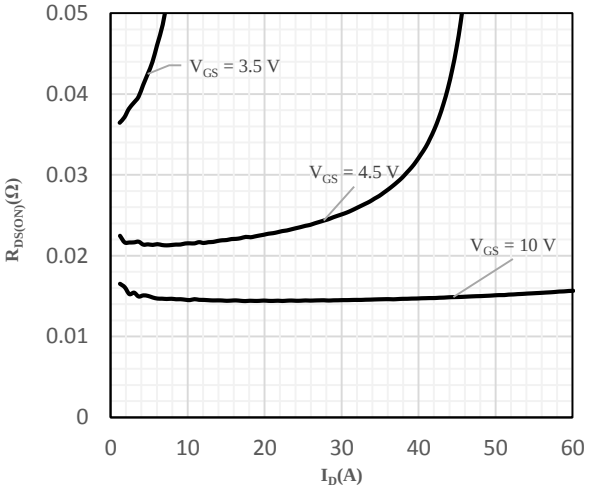


Fig 2 On-Resistance vs. Drain Current

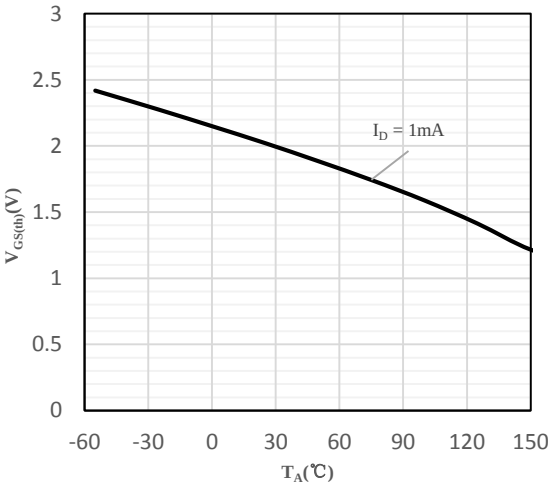


Fig 3 Gate Threshold Voltage vs. Junction Temperature

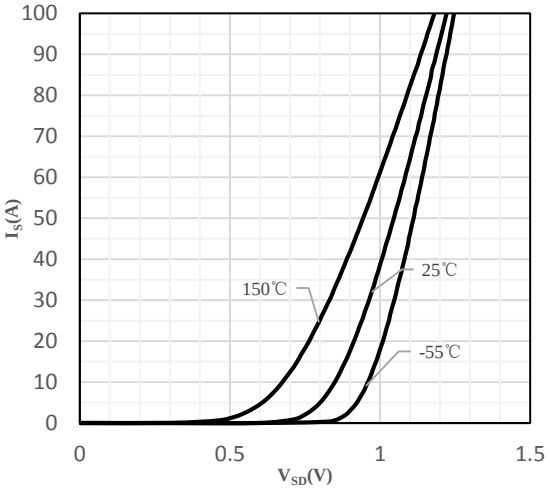


Fig 4 Body-Diode Characteristics

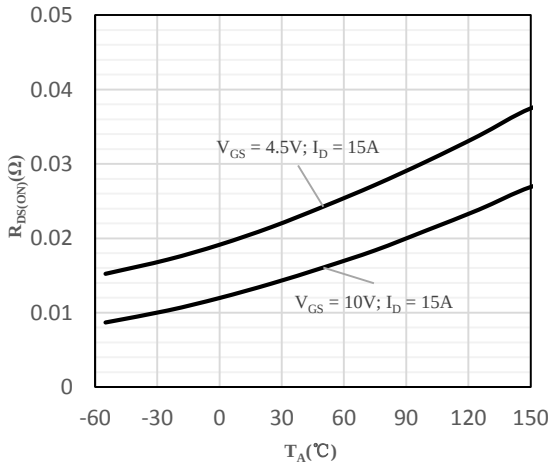


Fig 5 On-Resistance vs. Junction Temperature

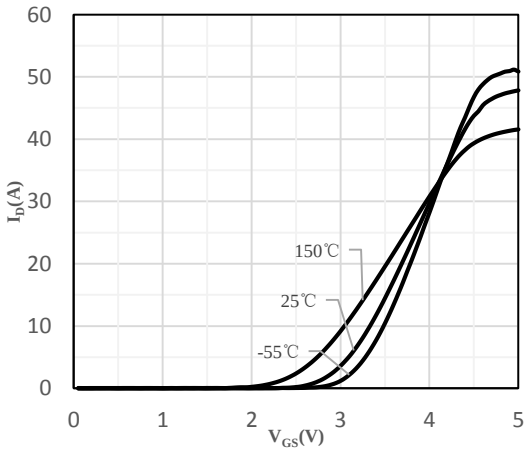


Fig 6 Transfer Characteristics

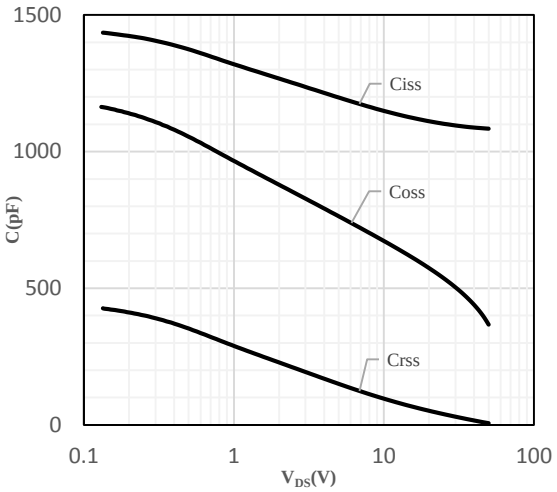


Fig 7 Capacitance Characteristics

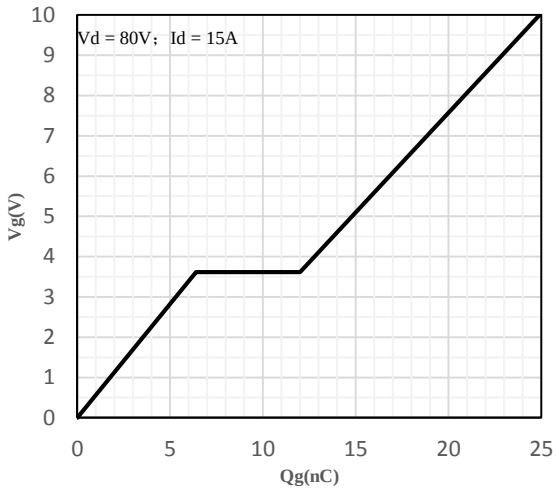


Fig 8 Gate-Charge Characteristics

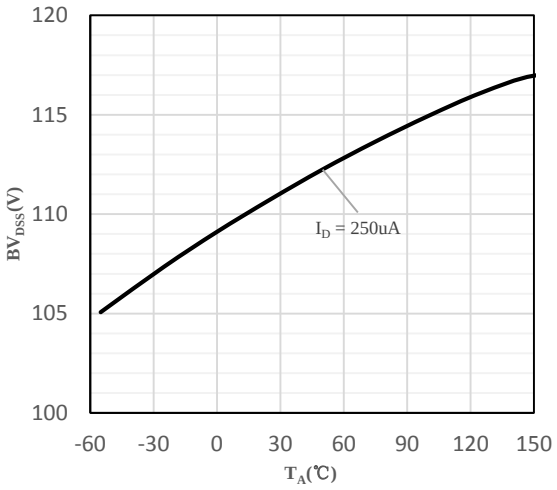


Figure 9 Normalized Breakdown Voltage vs. Air Temperature

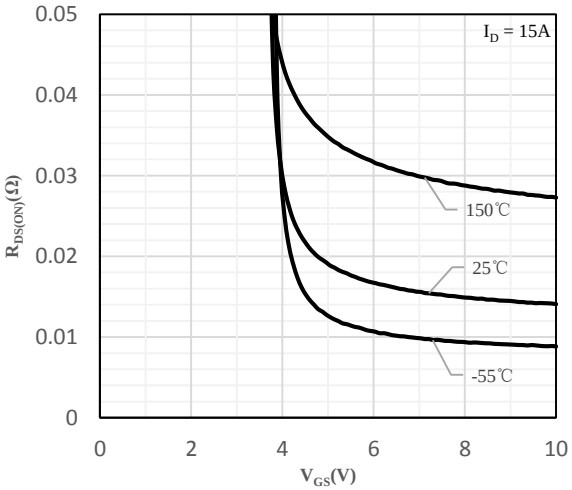


Figure 10 On-Resistance vs. Gate-Source Voltage

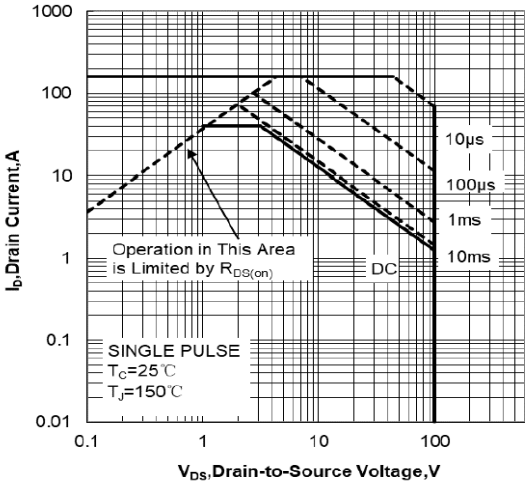
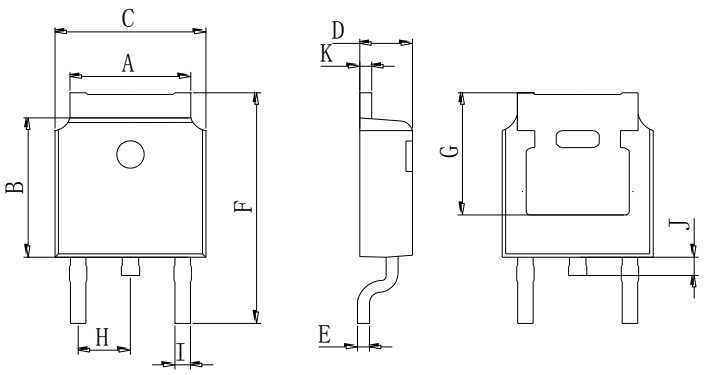


Fig 11 Maximum Safe Operating Area

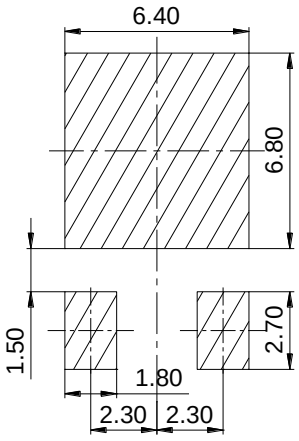
Package Outline Dimensions (Unit: mm)



TO-252		
Dimension	**Min.**	**Max.**
A	5.05	5.65
B	5.80	6.40
C	6.25	6.85
D	2.20	2.40
E	0.40	0.60
F	9.71	10.31
G	5.05	5.65
H	2.10	2.50
I	0.70	0.90
J	0.50	0.70
K	0.40	0.60

Mounting Pad Layout (Unit: mm)

TO-252



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