N-Channel Enhancement Mode MOSFET

TBL03N06E

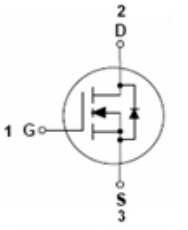
Features

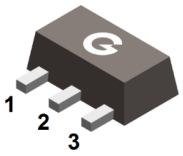
- Advanced trench technology
- Low on-resistance
- Fast switching speed
- Low gate drive
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

HF

Mechanical Data

- Case: SOT-89
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208





SOT-89

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL03N06E	SOT-89	1000 pcs / Tape & Reel	03N06

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_A = 25°C) *2		3	A
Continuous Drain Current (T_A = 70°C) *2		2.4	
Pulsed Drain Current (t_p =10μs, T_A = 25°C)	I_{DM}	20	A
Single Pulse Avalanche Energy *4	E_{AS}	9	mJ
Power Dissipation (T_A = 25°C) *1	P_D	2.6	W
Power Dissipation (T_A = 25°C) *2		1.5	
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-Air *1	$R_{\theta JA}$	-	-	47.4	°C/W
Thermal Resistance Junction-to-Air *2		-	-	83.3	

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	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 *3	V_{GS} = 10V, I_D = 3A	-	55	120	mΩ
		V_{GS} = 4.5V, I_D = 3A	-	72	140	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.8	1.6	2.2	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	7.7	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 40V f = 1MHz	-	420	-	pF
C_{OSS}	Output Capacitance		-	23	-	
C_{RSS}	Reverse Transfer Capacitance		-	20	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *5	V_{DD} = 30V V_{GS} = 10V R_G = 1Ω I_D = 1.5A	-	6.5	-	ns
t_r	Turn-on Rise Time *5		-	15.2	-	
$t_{d(OFF)}$	Turn-Off Delay Time *5		-	15.2	-	
t_f	Turn-Off Fall Time *5		-	10.3	-	
Q_G	Total Gate-Charge	V_{DD} = 30V V_{GS} = 10V I_D = 3A	-	8.8	-	nC
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 *3	I_{SD} = 2.8A, V_{GS} = 0V	-	0.82	2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_F = 3A d_{iF}/d_t = 100A/μs	-	14	-	ns
Q_{rr}	Reverse Recovery Charge		-	9	-	nC

Notes:

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

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

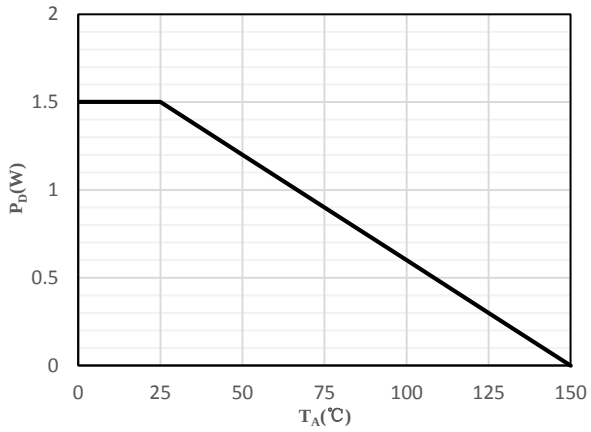


Fig 1 Power Dissipation

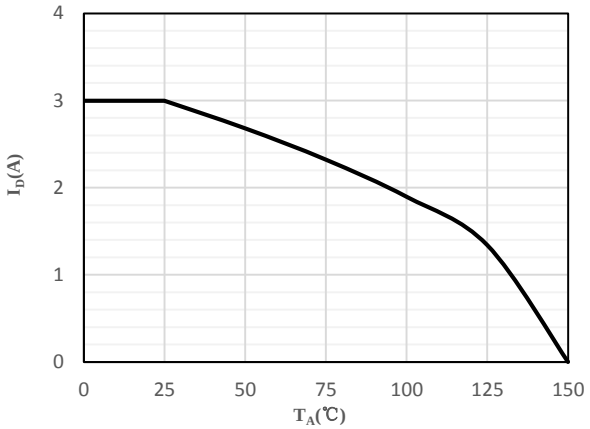


Fig 2 Drain Current

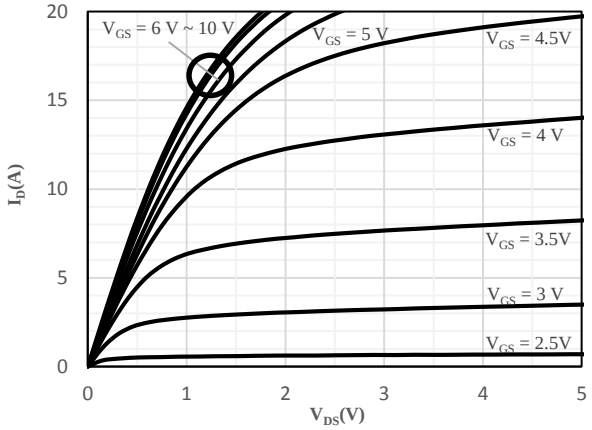


Fig 3 Typical Output Characteristics

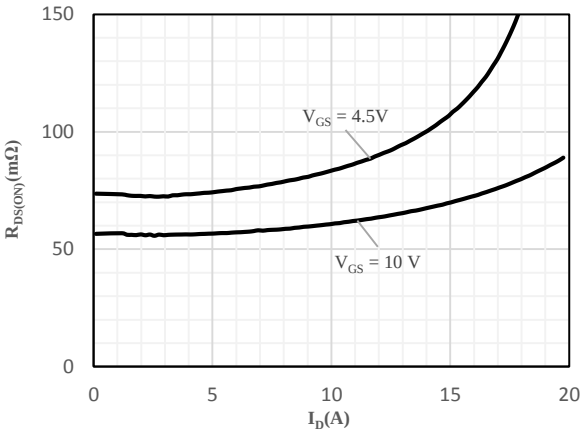


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

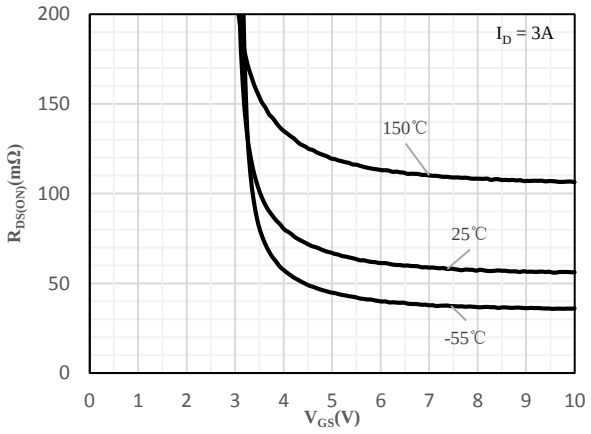


Fig 5 On-Resistance vs. Gate-Source Voltage

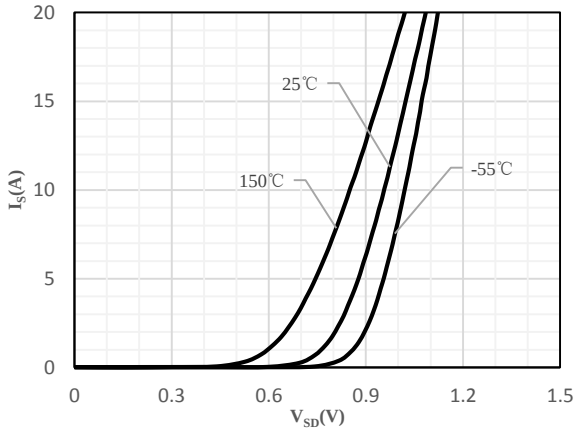


Fig 6 Body-Diode Characteristics

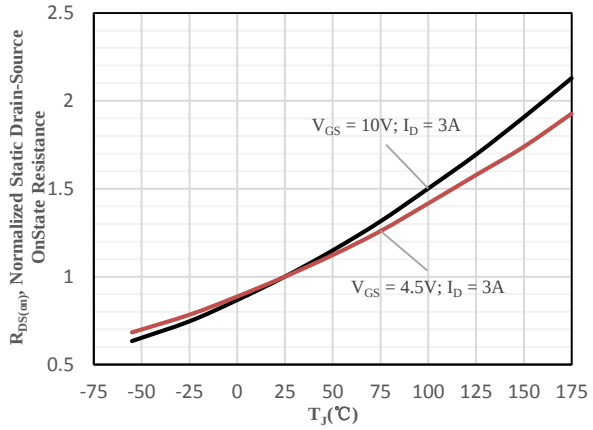


Fig 7 Normalized On-Resistance vs. Junction Temperature

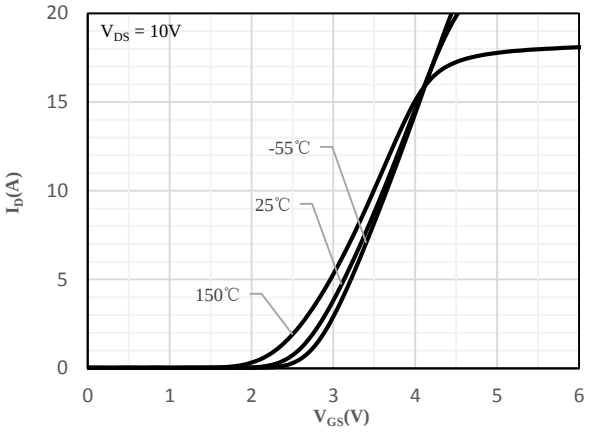


Fig 8 Transfer Characteristics

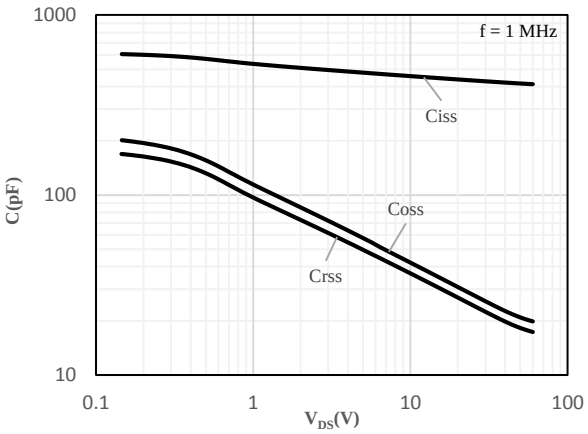


Fig 9 Capacitance Characteristics

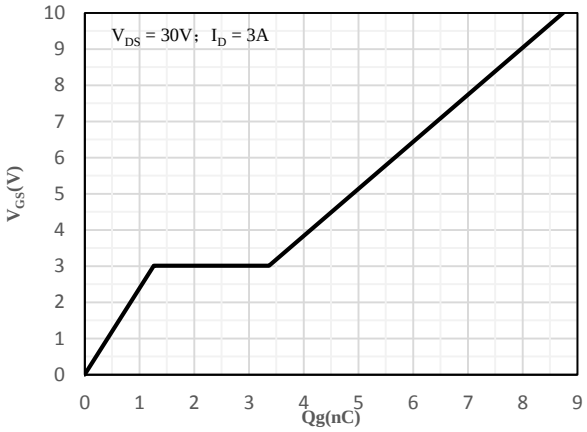


Fig 10 Gate-Charge Characteristics

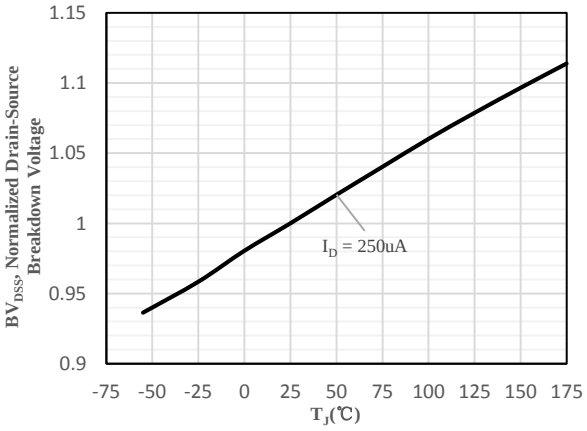


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

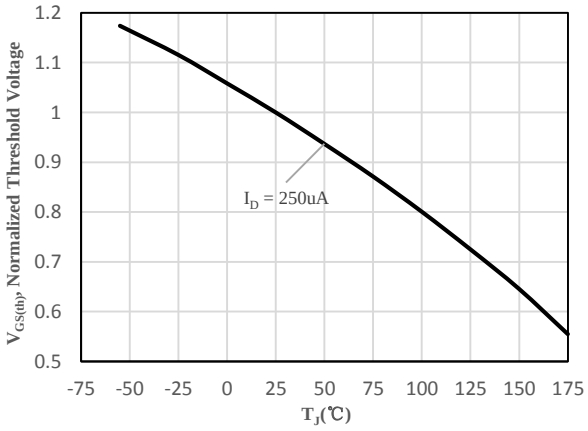
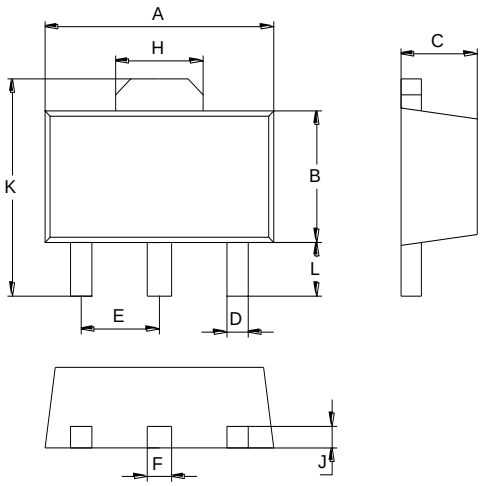


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



SOT-89		
Dimension	**Min.**	**Max.**
A	4.30	4.70
B	2.25	2.65
C	1.30	1.70
D	0.30	0.50
E	1.40	1.60
F	0.38	0.58
H	1.60	1.80
J	0.30	0.50
L	0.90	1.10
K	3.95	4.35

Mounting Pad Layout (Unit: mm)

SOT-89

