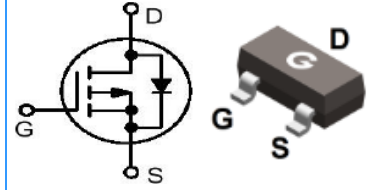


Features

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

HF



SOT-23

Mechanical Data

- Case: SOT-23
- 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
TBL6202	SOT-23	3000 pcs / Tape & Reel	D1

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 ($T_C = 25^\circ\text{C}$)	I_D	-2.7	A
Continuous Drain Current ($T_A = 25^\circ\text{C}$) *2		-1.9	A
Continuous Drain Current ($T_A = 70^\circ\text{C}$) *2		-1.5	A
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_A = 25^\circ\text{C}$)	I_{DM}	-19	A
Pulsed Drain Current ($t_p = 300\mu\text{s}$, $T_A = 25^\circ\text{C}$)		-7.6	A
Single Pulse Avalanche Energy *5	E_{AS}	14	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	2	W
Power Dissipation ($T_A = 25^\circ\text{C}$) *1		1.25	W
Power Dissipation ($T_A = 25^\circ\text{C}$) *2		1	W
Power Dissipation ($T_A = 25^\circ\text{C}$) *3		0.35	W
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	$R_{\theta JC}$	-	-	62	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	100	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air *2		-	105	125	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air *3		-	200	357	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250μA	-60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -48V, 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 *4	V _{GS} = -10V, I _D = -1.5A	-	115	150	mΩ
		V _{GS} = -4.5V, I _D = -1A	-	155	200	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.7	-3	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	8.4	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V	-	425	-	pF
C _{OSS}	Output Capacitance	V _{DS} = -15V	-	48	-	
C _{RSS}	Reverse Transfer Capacitance	f = 1.0MHz	-	38	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *6	V _{DD} = -15V	-	17.4	-	ns
t _r	Turn-on Rise Time *6	V _{GS} = -10V	-	5.4	-	
t _{d(OFF)}	Turn-Off Delay Time *6	R _G = 3.3Ω	-	37.2	-	
t _f	Turn-Off Fall Time *6	I _D = -1A	-	2.4	-	
Q _G	Total Gate-Charge	V _{DD} = -20V	-	12	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = -10V	-	2.1	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = -1.5A	-	2.1	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *4	I _{SD} = -1A, V _{GS} = 0V	-	-0.8	-1.4	V
t _{rr}	Reverse Recovery Time	I _{SD} = -4A, V _{GS} = 0V	-	26	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100A/μs	-	22	-	nC

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, $t \leq 10s$
2. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, steady state
3. The data tested by surface mounted on a minimum recommended FR-4 board
4. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
5. The E_{AS} data shows Max. rating. The test condition is $V_{DD} = -30V, V_{GS} = -10V, L = 0.5mH$
6. Guaranteed by design, not subject to production

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

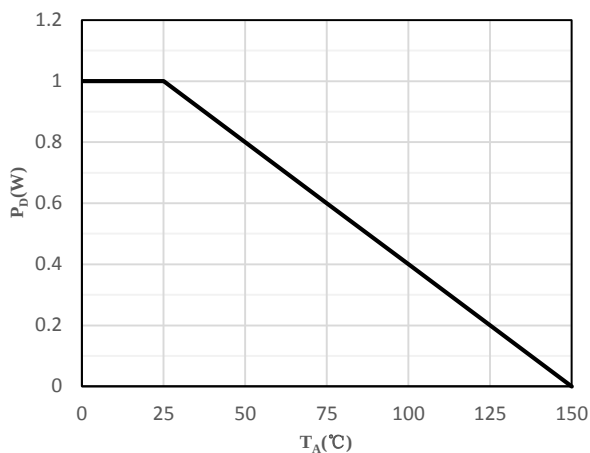


Fig 1 Power Dissipation

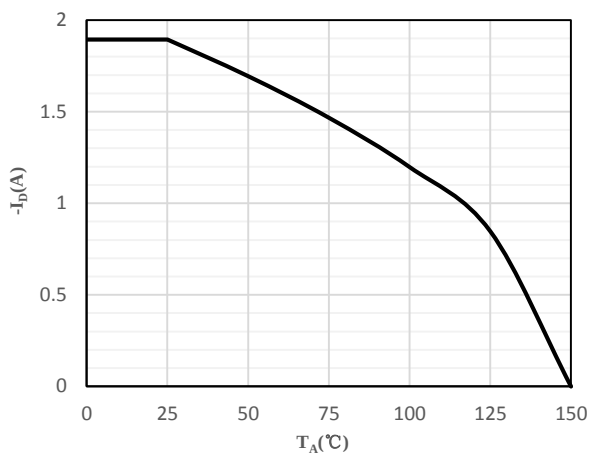


Fig 2 Drain Current

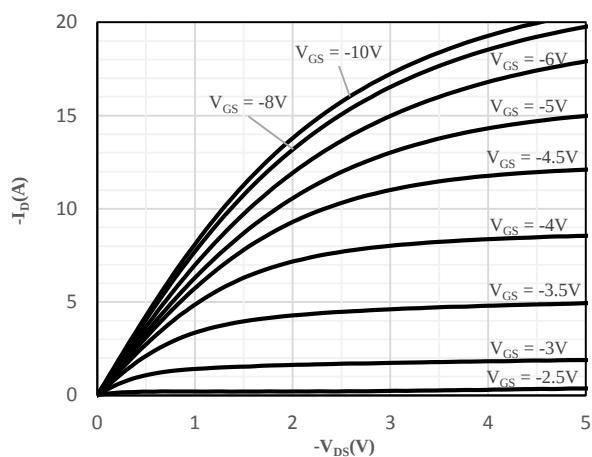
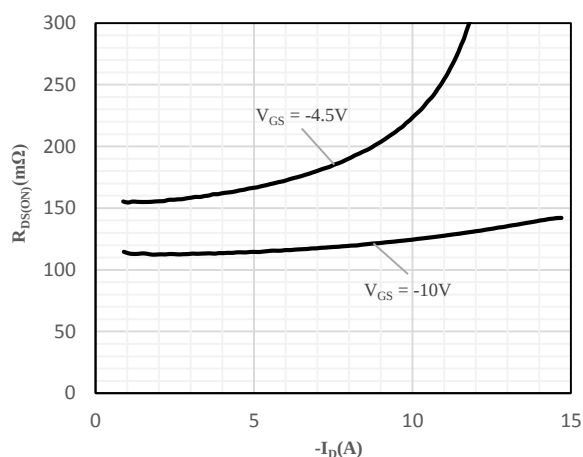


Fig 3 Typical Output Characteristics



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

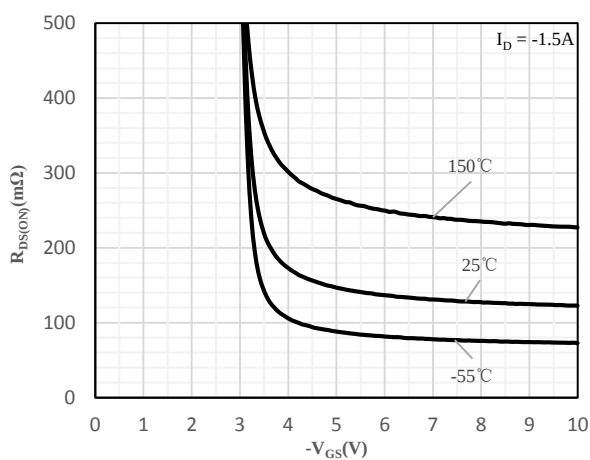


Fig 5 On-Resistance vs. Gate-Source Voltage

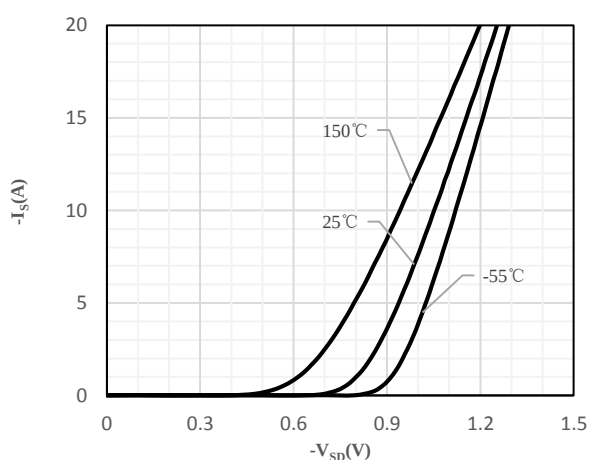


Fig 6 Body-Diode Characteristics

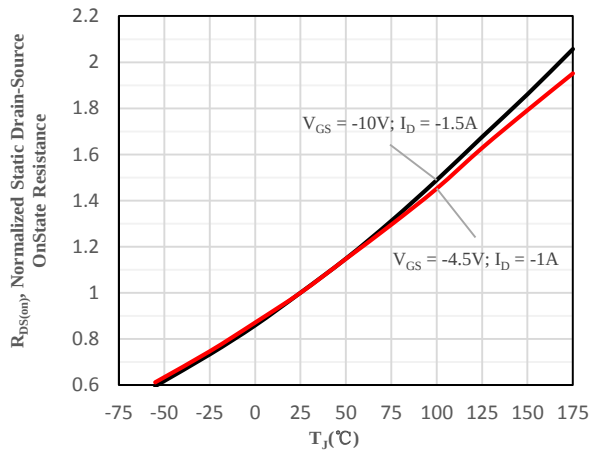


Fig 7 Normalized On-Resistance vs. Junction Temperature

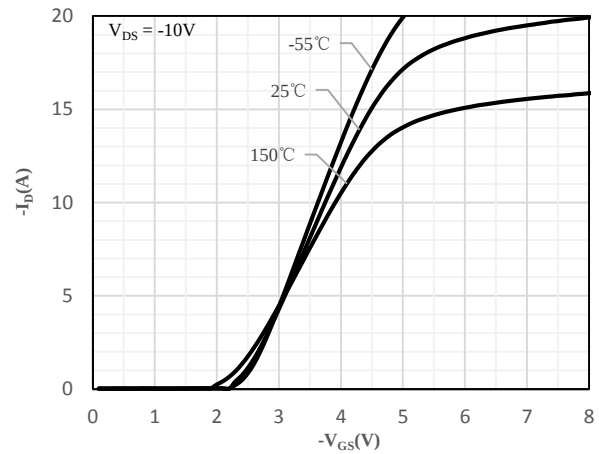


Fig 8 Transfer Characteristics

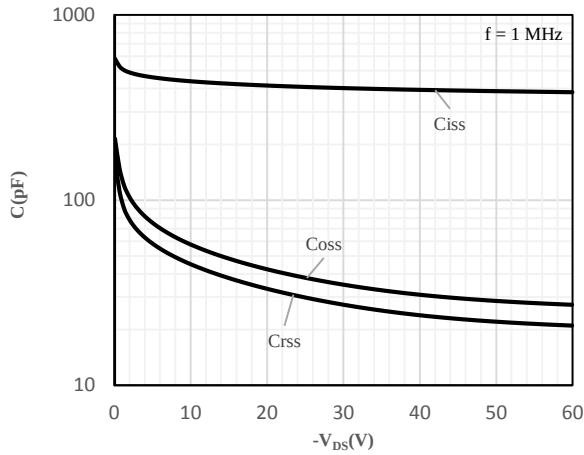


Fig 9 Capacitance Characteristics

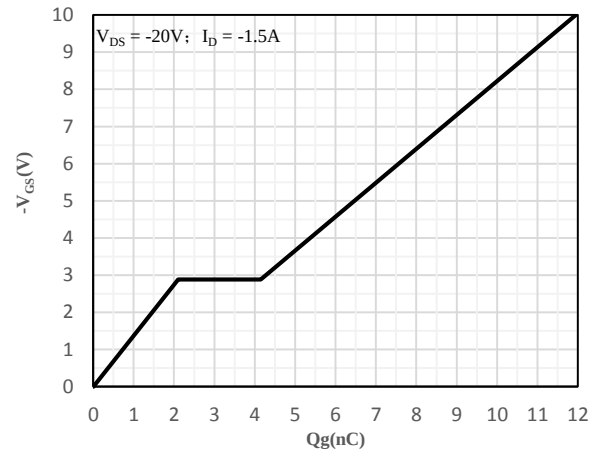


Fig 10 Gate-Charge Characteristics

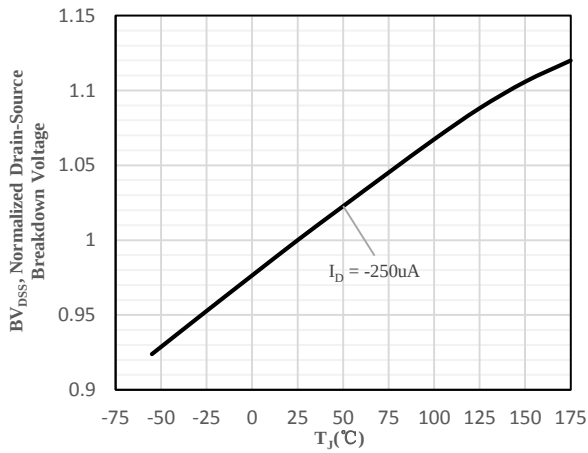


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

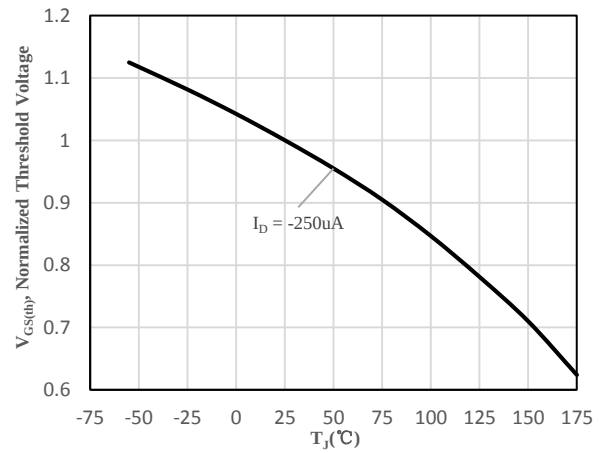
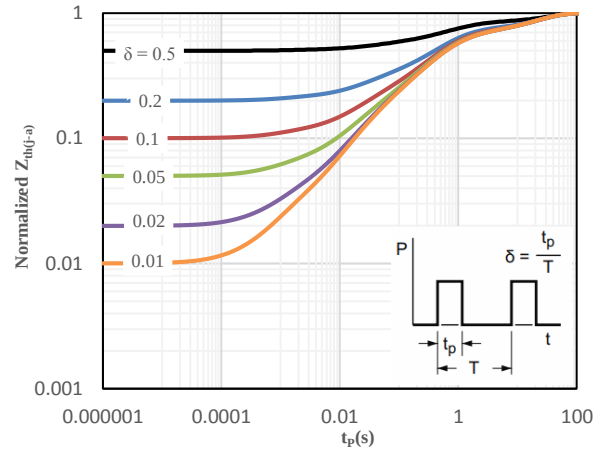
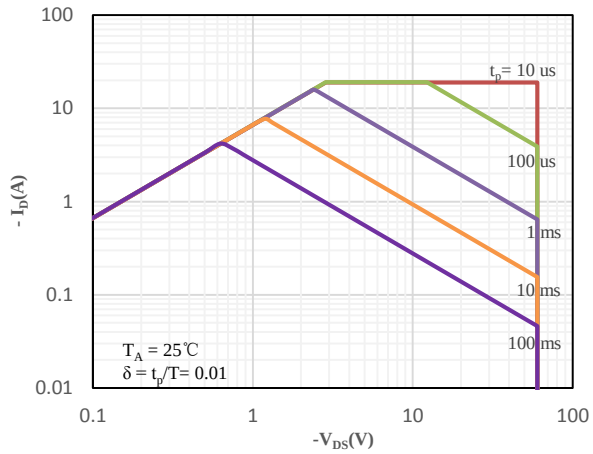
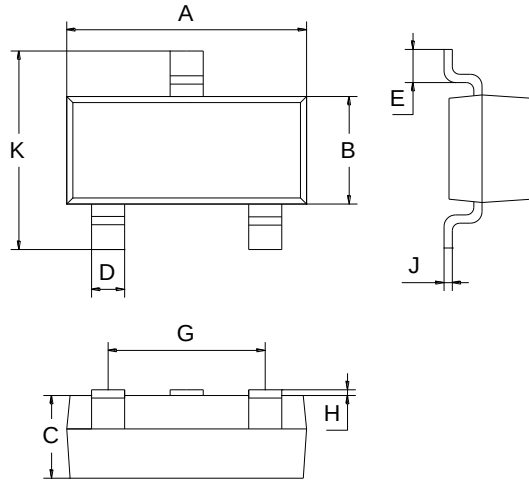


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature



Package Outline Dimensions (Unit: mm)



SOT-23		
Dimension	Min.	Max.
A	2.70	3.10
B	1.10	1.50
C	0.90	1.10
D	0.30	0.50
E	0.35	0.48
G	1.80	2.00
H	0.02	0.10
J	0.05	0.15
K	2.20	2.60

Mounting Pad Layout (Unit: mm)

SOT-23

