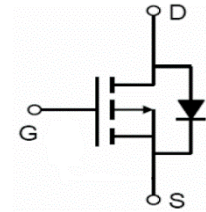


Features

- $R_{DS(ON)} \leq 50m\Omega$ @ $V_{GS} = -4.5V$
- $R_{DS(ON)} \leq 70m\Omega$ @ $V_{GS} = -2.5V$
- High-speed switching
- Drive circuits can be simple
- Parallel use is easy
- HBM: AEC-Q101-001: H1A (JESD22-A114-B: 1A)
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 standards for high reliability

HF

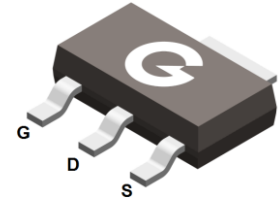


Typical Applications

- Power management in Note Book
- Switching application
- Battery Powered System
- Load switch

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
TBL500P02R	SOT-223	4000 pcs / Tape & Reel	500P02R

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	-20	V
Gate-to-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ($T_C = 25^\circ\text{C}$)	I_D	-12	A
Continuous Drain Current ($T_A = 25^\circ\text{C}$) *1		-6	A
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_A = 25^\circ\text{C}$)	I_{DM}	-36	A
Single Pulse Avalanche Energy *3	E_{AS}	10	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	10	W
Power Dissipation ($T_A = 25^\circ\text{C}$) *1		2.1	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	$R_{\theta JC}$	-	-	12	$^{\circ}\text{C/W}$
Thermal Resistance Junction-to-Air ^{*1}	$R_{\theta JA}$	-	-	60	$^{\circ}\text{C/W}$

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250μA	-20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} = 0V	-	-	-1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±12V, V _{DS} = 0V	-	-	±100	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance *2	V _{GS} = -4.5V,I _D = -3A	-	36	50	mΩ
		V _{GS} = -2.5V,I _D = -2A	-	48	70	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.5	-0.75	-0.9	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	29	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = -5V f = 1.0MHz	-	1009	-	pF
C _{OSS}	Output Capacitance		-	134	-	
C _{RSS}	Reverse Transfer Capacitance		-	111	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *4	V _{DD} = -15V, I _D = -4.2A R _L = 3.6Ω, V _{GS} = -10V R _G = 6Ω	-	5.9	-	ns
t _r	Turn-on Rise Time *4		-	3.6	-	
t _{d(OFF)}	Turn-Off Delay Time *4		-	32.4	-	
t _f	Turn-Off Fall Time *4		-	2.6	-	
Q _G	Total Gate-Charge	V _{DD} = -16V V _{GS} = -4.5V I _D = -4.2A	-	10.7	-	nC
Q _{GS}	Gate to Source Charge		-	2.2	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	2.7	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = -3A, V _{GS} = 0V	-	-0.84	-1.2	V

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper
- The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- The E_{AS} data shows Max. rating. The test condition is $V_{DD} = -10\text{V}, V_{GS} = -6\text{V}, L = 0.5\text{mH}$
- Guaranteed by design, not subject to production

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

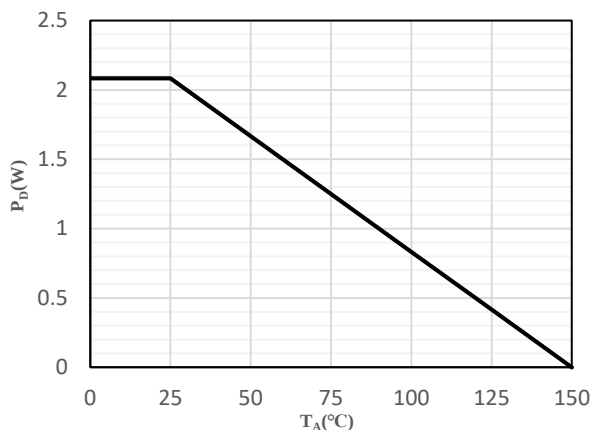


Fig 1 Power Dissipation

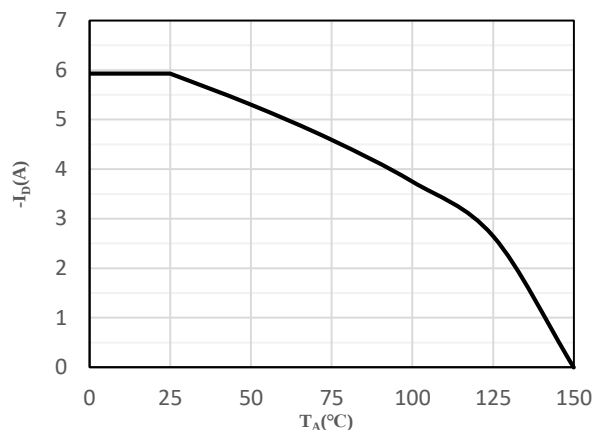


Fig 2 Drain Current

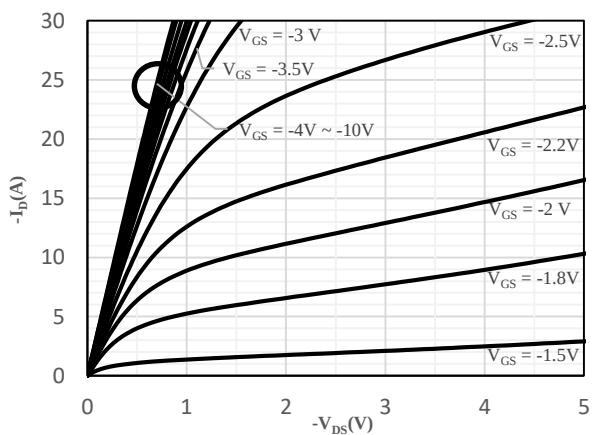


Fig 3 Typical Output Characteristics

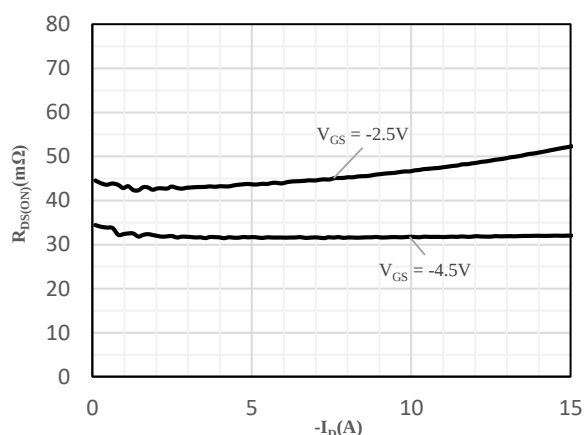


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

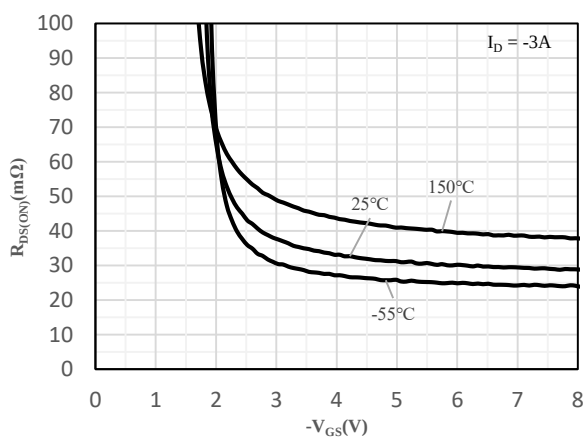


Fig 5 On-Resistance vs. Gate-Source Voltage

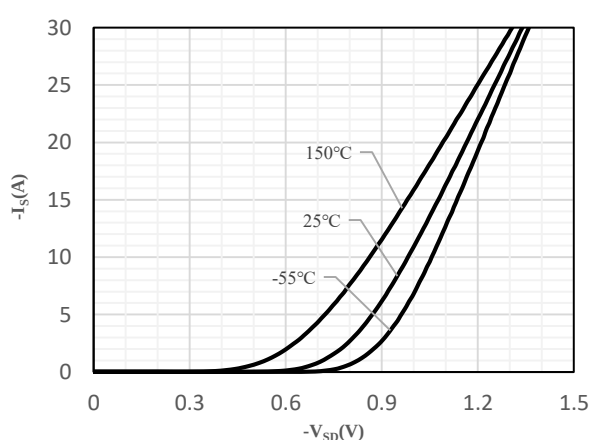


Fig 6 Body-Diode Characteristics

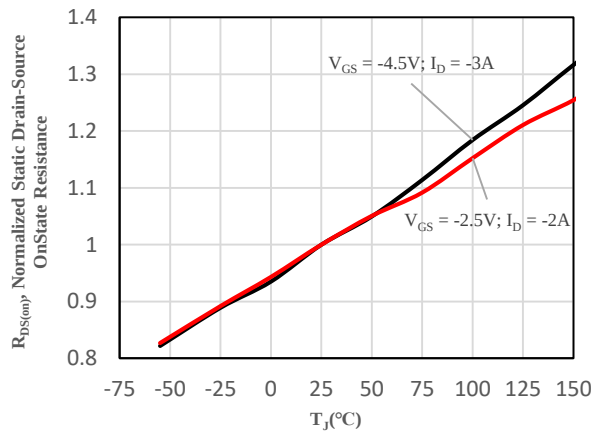


Fig 7 Normalized On-Resistance vs. Junction Temperature

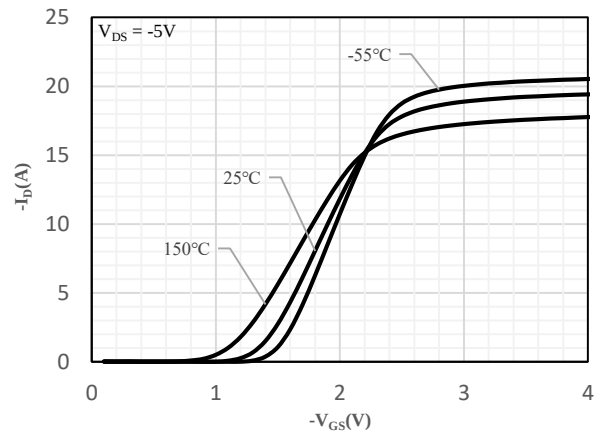


Fig 8 Transfer Characteristics

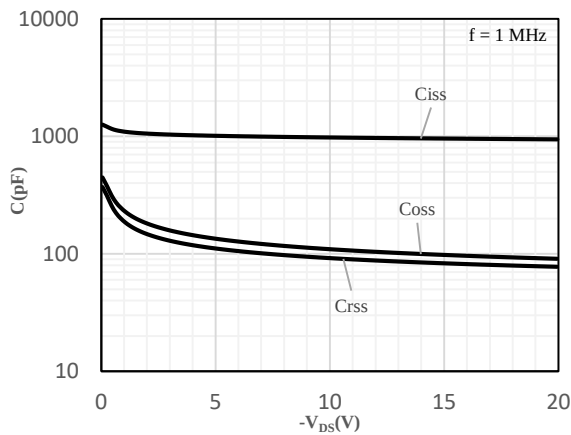


Fig 9 Capacitance Characteristics

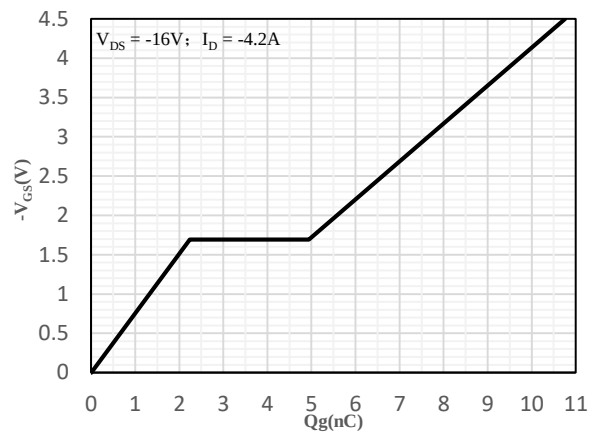


Fig 10 Gate-Charge Characteristics

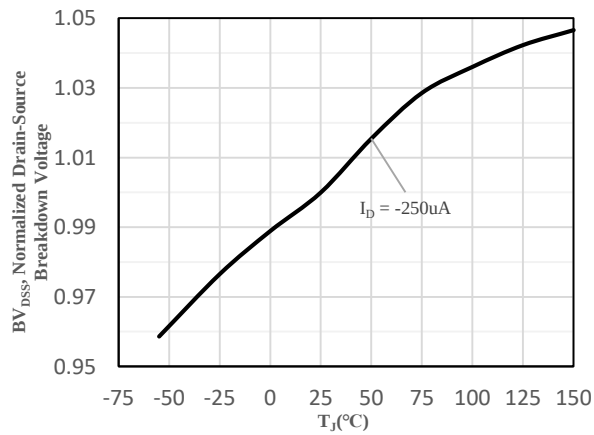


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

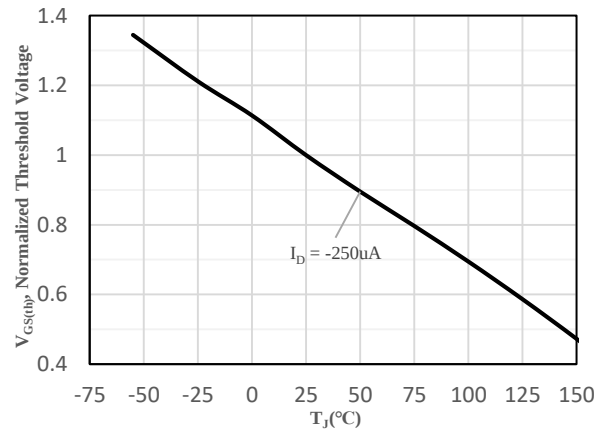
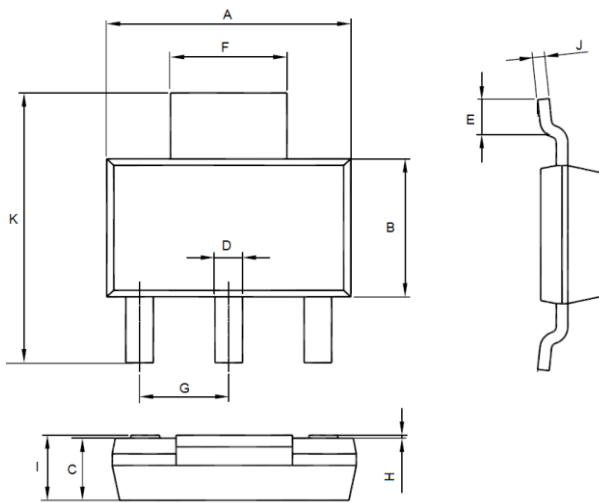


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



SOT-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

