

Features

- $R_{DS(ON)} \leq 52m\Omega @ V_{GS} = -10V$
- $R_{DS(ON)} \leq 87m\Omega @ V_{GS} = -4.5V$
- High-speed Switching
- Drive Circuits Can be Simple
- Parallel Use is Easy
- RoHS compliant with Halogen-free
- Qualified to AEC-Q101 Standards

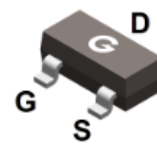
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Typical Applications

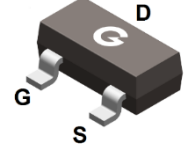
- Power Management in Note Book
- Switching Application
- Battery Powered System
- Load Switch

Mechanical Data

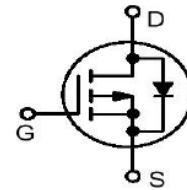
- Case: SOT-23, SOT-23-3L
- Molding Compound, UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Plated Leads, Solderable Per MIL-STD-202, Method 208



TBL3407
SOT-23



TBL3407-3L
SOT-23-3L



Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL3407	SOT-23	3000 pcs / Tape & Reel	3407
TBL3407-3L	SOT-23-3L	3000 pcs / Tape & Reel	3407

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate -Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_A = 25^\circ\text{C}$) *1	I_D	-4.3	A
Continuous Drain Current ($T_A = 70^\circ\text{C}$) *1		-3.5	A
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_A = 25^\circ\text{C}$)	I_{DM}	-17	A
Single Pulse Avalanche Energy *4	E_{AS}	12	mJ
Power Dissipation ($T_A = 25^\circ\text{C}$) *1	P_D	1.25	W
Power Dissipation ($T_A = 25^\circ\text{C}$) *2		0.35	W
Operating Junction Temperature Range	T_J	-55 ~ +150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction to Ambient Air ^{*1}	R _{θJA}	100	°C/W
Thermal Resistance Junction to Ambient Air ^{*2}		357	°C/W
Thermal Resistance Junction to Lead ^{*2}	R _{θJL}	214	°C/W
Thermal Resistance Junction to Case ^{*2}	R _{θJC}	180	°C/W

Electrical Characteristics (@ T_A = 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	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -24V, 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 = -4.1A	-	40	52	mΩ
		V _{GS} = -4.5V, I _D = -3A	-	59	87	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.5	-2.1	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	12	-	Ω
Dynamic Characteristics						
g _{FS}	Forward Transconductance	V _{DS} = -5V, I _D = -4A	-	7	-	S
C _{ISS}	Input Capacitance	V _{GS} = 0V	-	793	-	pF
C _{OSS}	Output Capacitance	V _{DS} = -15V	-	78	-	
C _{RSS}	Reverse Transfer Capacitance	f = 1.0MHz	-	61	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time ^{*5}	V _{DD} = -15V, V _{GS} = -10V R _G = 2.5Ω, R _L = 15Ω I _D = -1A	-	5	-	ns
t _r	Turn-on Rise Time ^{*5}		-	6	-	
t _{d(OFF)}	Turn-Off Delay Time ^{*5}		-	28	-	
t _f	Turn-Off Fall Time ^{*5}		-	7	-	
Q _G	Total Gate-Charge	V _{DD} = -20V	-	8	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = -4.5V	-	2.6	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = -3A	-	2.6	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage ^{*3}	I _{SD} = -1A, V _{GS} = 0V, T _J = 25°C	-	-0.8	-1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} = -3A, V _{GS} = 0V	-	125	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100A/μs	-	110	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper
- The data tested by surface mounted on a minimum recommended FR-4 board
- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The E_{AS} data shows Max. rating. The test condition is V_{DD} = -15V, V_{GS} = -10V, L = 0.1mH
- Guaranteed by design, not subject to production

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

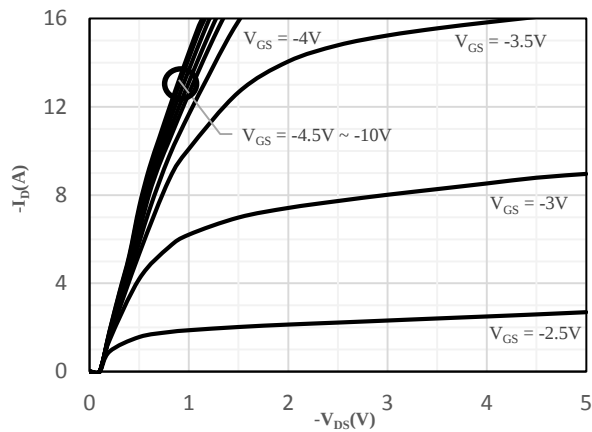


Fig 1 Typical Output Characteristics

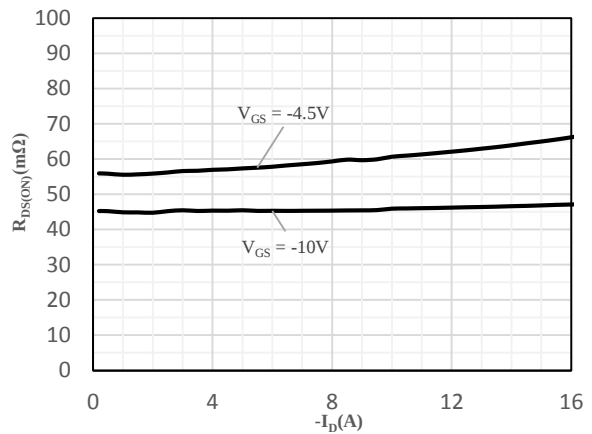


Fig 2 On-Resistance vs. Drain Current
and Gate Voltage

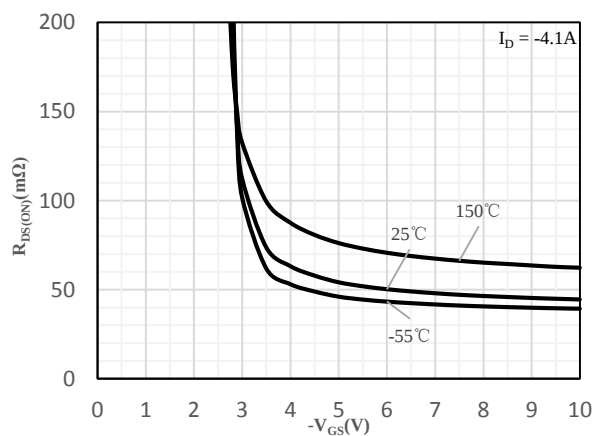


Fig 3 On-Resistance vs. Gate-Source Voltage

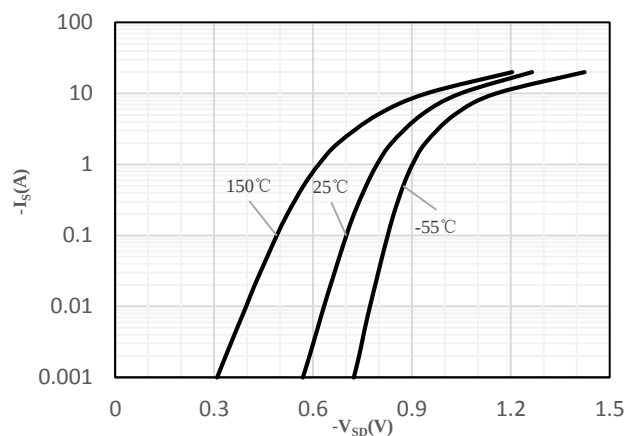


Fig 4 Body-Diode Characteristics

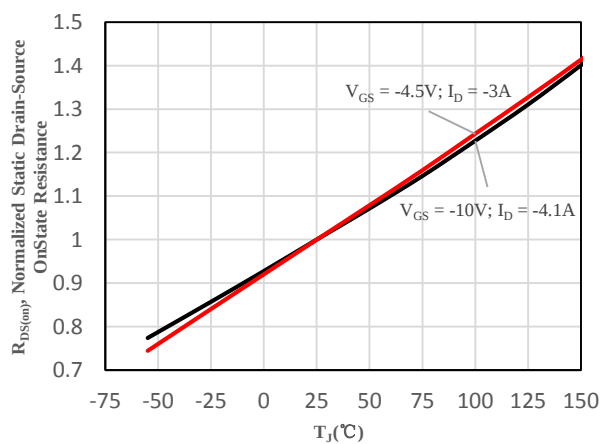


Fig 5 Normalized On-Resistance vs. Junction
Temperature

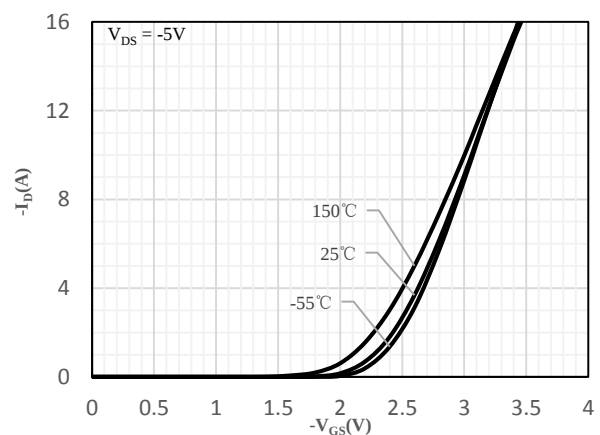


Fig 6 Transfer Characteristics

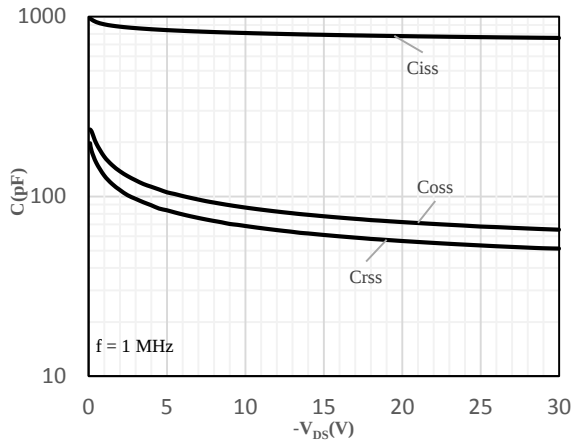


Fig 7 Capacitance Characteristics

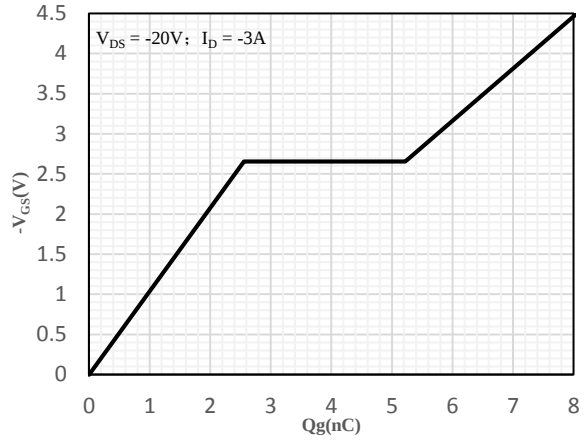


Fig 8 Gate-Charge Characteristics

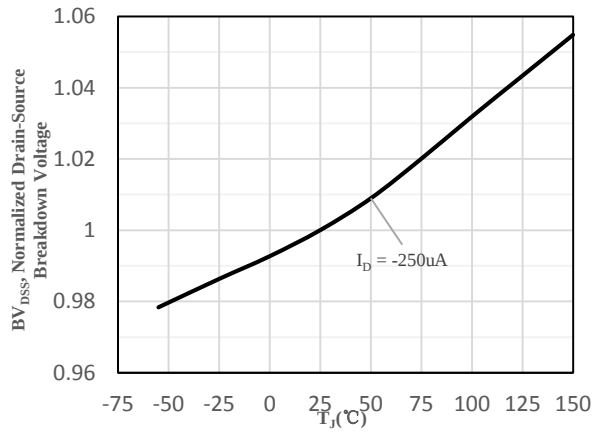


Fig 9 Normalized Breakdown Voltage
vs. Junction Temperature

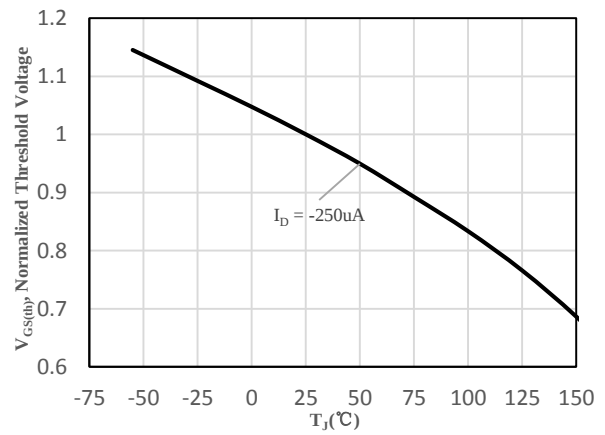


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

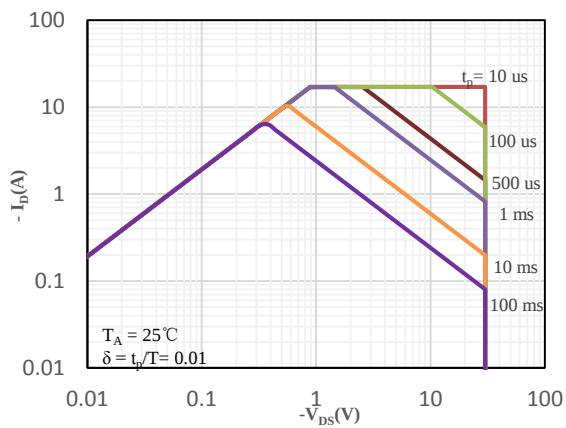


Fig 11 Safe Operation Area

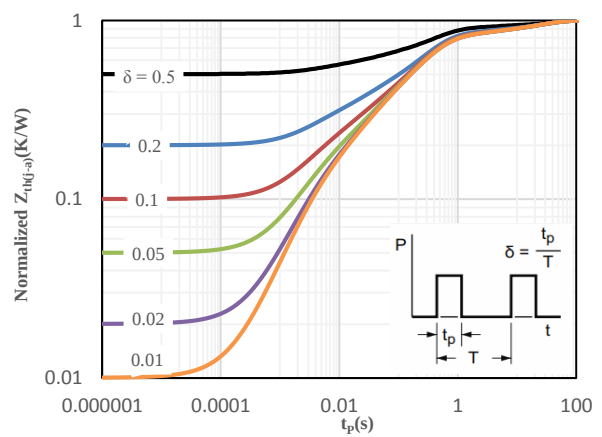
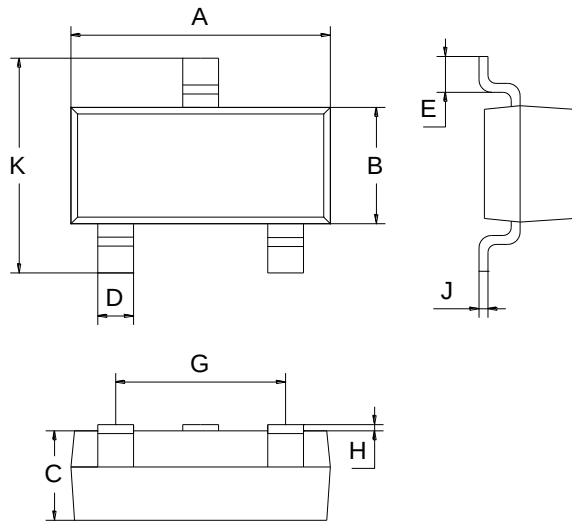


Fig 12 Normalized Maximum transient thermal
impedance

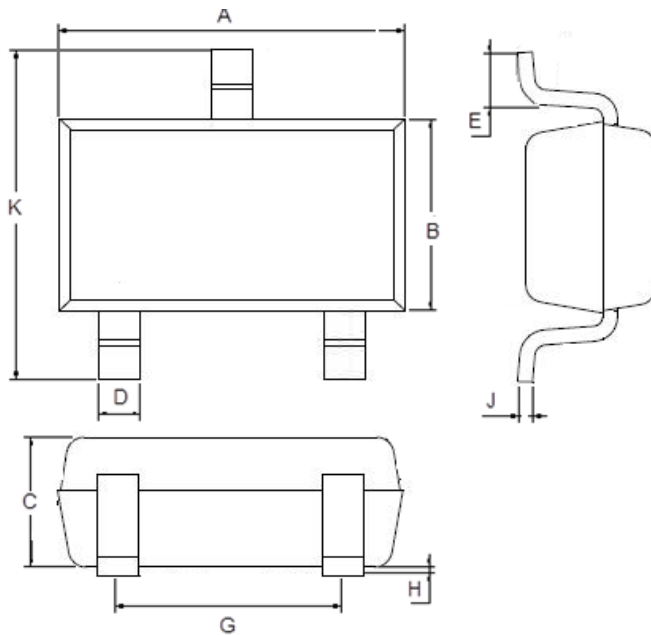
Package Outline Dimensions (unit: mm)

SOT-23



SOT-23		
Dim	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

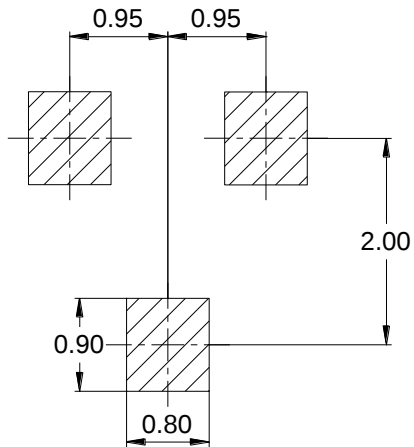
SOT-23-3L



SOT-23-3L		
Dim	Min	Max
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
G	1.80	2.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00
All Dimensions in mm		

Mounting Pad Layout (unit: mm)

SOT-23



SOT-23-3L

