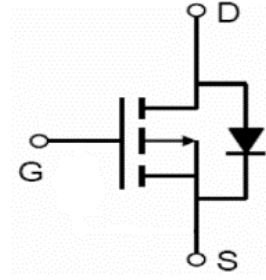


Features

- $R_{DS(ON)} < 90m\Omega$ @ $V_{GS} = 10V$
- High density cell design for ultralow $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- JESD22-A114-B ESD rating of class 1C per human body model
- Halogen free
- Qualified to AEC-Q101 standards for high reliability

HF

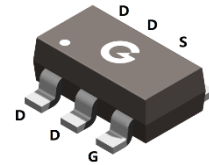


Typical Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Mechanical Data

- Case: SOT-23-6L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



SOT-23-6L

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TBL4P06-6L	SOT-23-6L	3000 pcs / Tape & Reel	4P06

Maximum Ratings (@ $T_A = 25^\circ\text{C}$ 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 ($T_C = 25^\circ\text{C}$)	I_D	-4	A
Continuous Drain Current ($T_A = 25^\circ\text{C}$) *1		-3.1	A
Continuous Drain Current ($T_A = 70^\circ\text{C}$) *1		-2.5	A
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_A = 25^\circ\text{C}$)	I_{DM}	-20	A
Single Pulse Avalanche Energy *4	E_{AS}	14	mJ
Power Dissipation ($T_A = 25^\circ\text{C}$)	P_D	1.6	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	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	-	25	$^{\circ}\text{C/W}$
Thermal Resistance Junction-to-Air ^{*1}	$R_{\theta JA}$	-	67	78	$^{\circ}\text{C/W}$
Thermal Resistance Junction-to-Air ^{*2}		-	-	156	$^{\circ}\text{C/W}$

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} = -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 = -4A	-	70	90	mΩ
		V _{GS} = -4.5V, I _D = -4A	-	100	135	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.6	-3	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	17	-	Ω
Dynamic Characteristics						
g _{FS}	Forward Transconductance	V _{DS} = -5V, I _D = -4A	-	10	-	S
C _{ISS}	Input Capacitance	V _{GS} = 0V	-	930	-	pF
C _{OSS}	Output Capacitance	V _{DS} = -30V	-	55	-	
C _{RSS}	Reverse Transfer Capacitance	f = 1.0MHz	-	41	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *5	V _{DD} = -30V	-	8	-	ns
t _r	Turn-on Rise Time *5	V _{GS} = -10V	-	4	-	
t _{d(OFF)}	Turn-Off Delay Time *5	R _G = 3Ω	-	32	-	
t _f	Turn-Off Fall Time *5	R _L = 7.5Ω	-	7	-	
Q _G	Total Gate-Charge	V _{DD} = -30V	-	20	-	nC
Q _{GS}	Gate to Source Charge	I _D = -4A	-	3.1	-	
Q _{GD}	Gate to Drain (“Miller”) Charge	V _{GS} = -10V	-	3.2	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *3	I _{SD} = -4A, V _{GS} = 0V	-	-0.88	-1.2	V
t _{rr}	Reverse Recovery Time	I _F = -4A, V _{GS} = 0V	-	23	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100A/μs	-	11	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper
- The data tested by surface mounted on a minimum recommended FR-4 board
- 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 $V_{DD} = -30\text{V}, V_{GS} = -10\text{V}, L = 0.1\text{mH}$
- Guaranteed by design, not subject to production

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

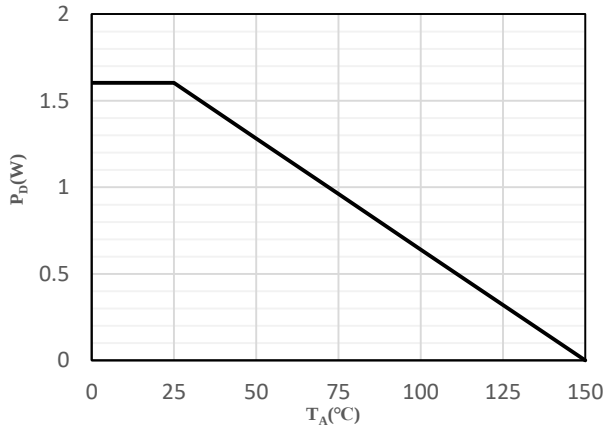


Fig 1 Power Dissipation

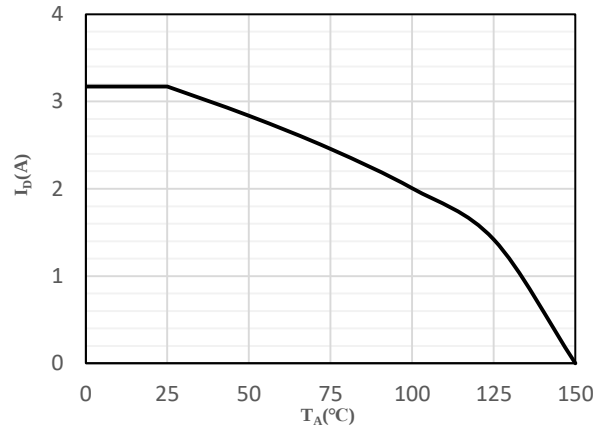


Fig 2 Drain Current

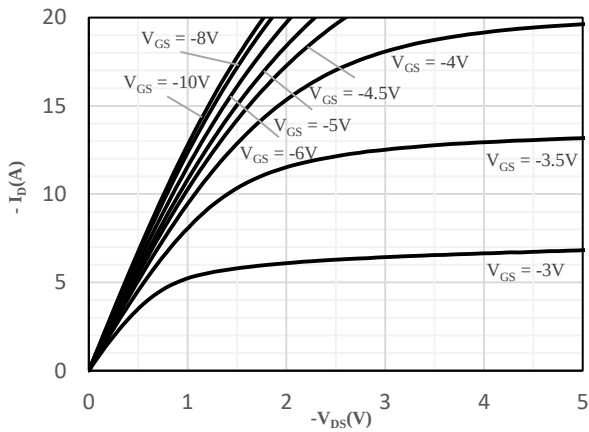


Fig 3 Output Characteristics

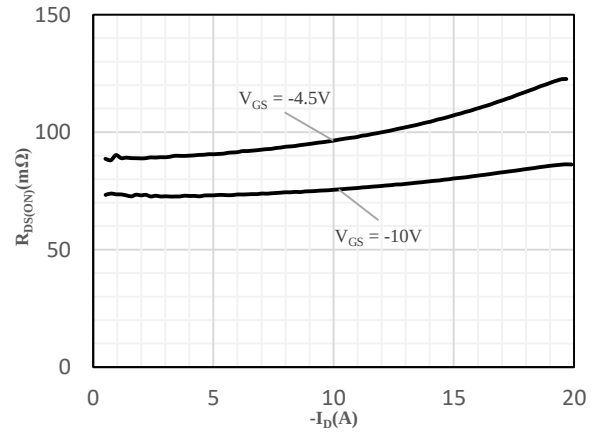


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

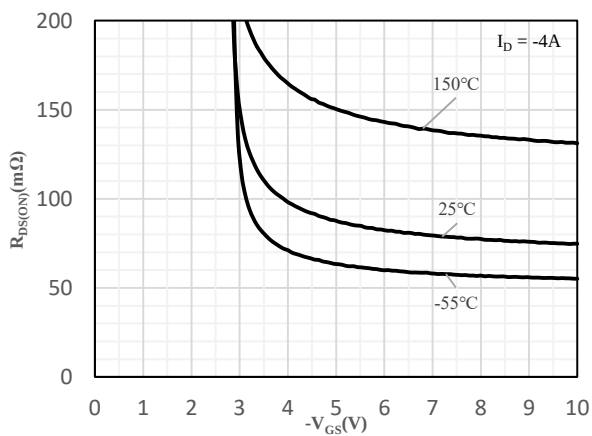


Fig 5 On-Resistance vs. Gate-Source Voltage

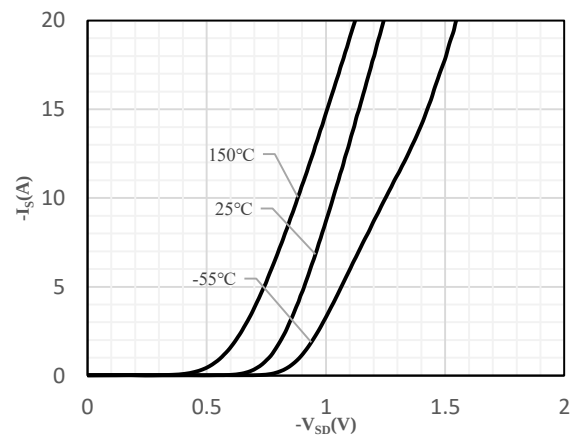


Fig 6 Body-Diode Characteristics

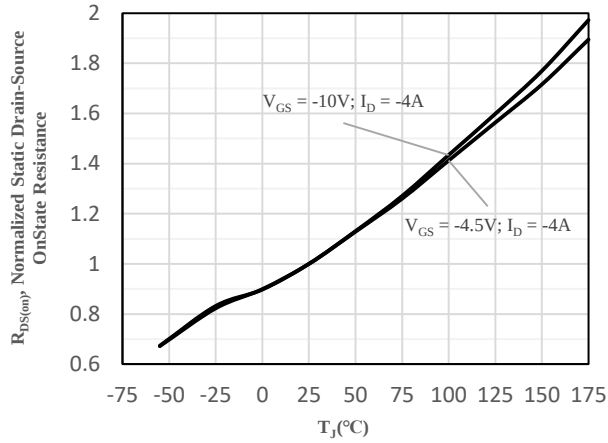


Fig 7 Normalized On-Resistance vs. Junction Temperature

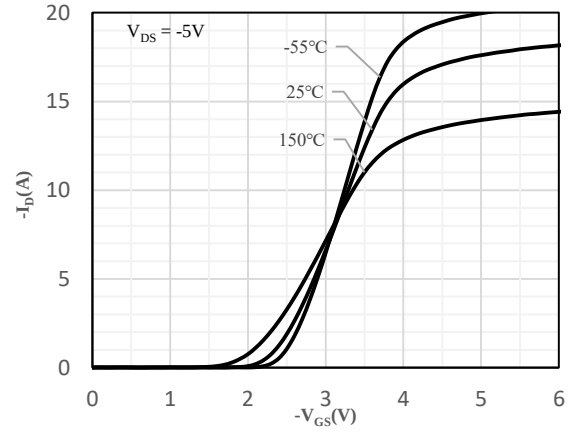


Fig 8 Transfer Characteristics

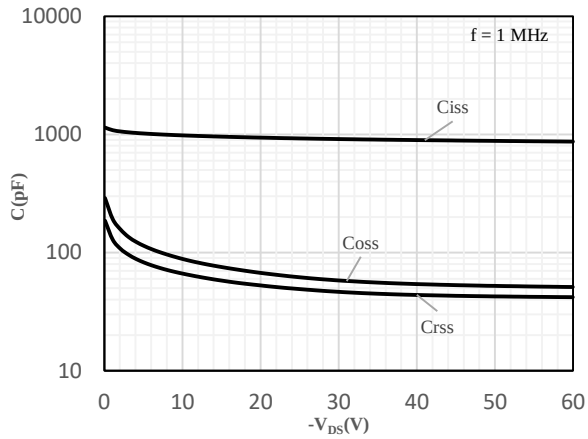


Fig 9 Capacitance Characteristics

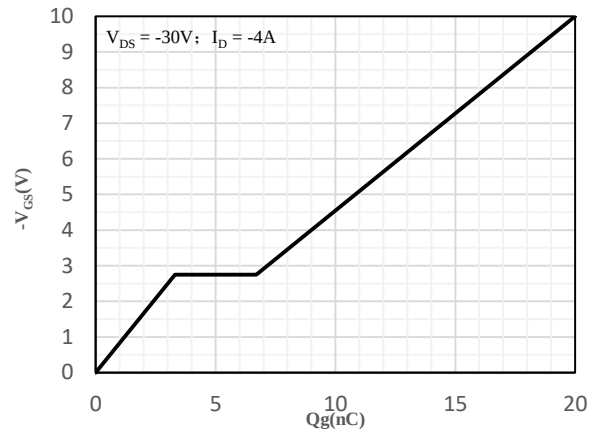


Fig 10 Gate-Charge Characteristics

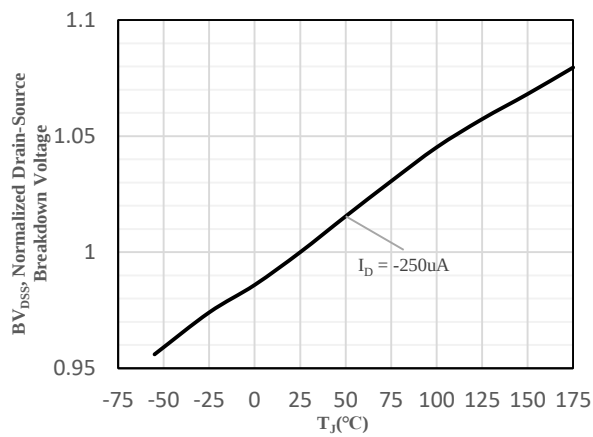


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

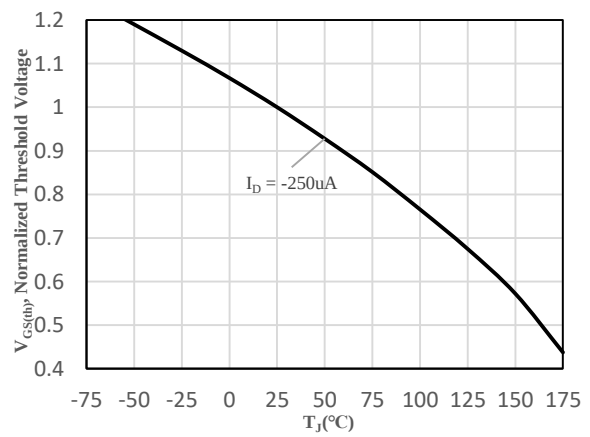


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

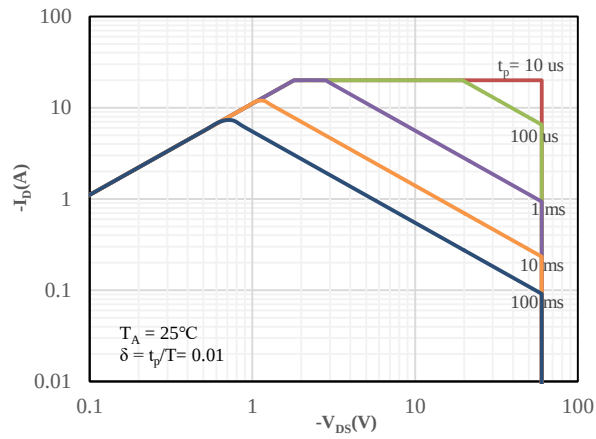


Fig 13 Maximum Safe Operating Area

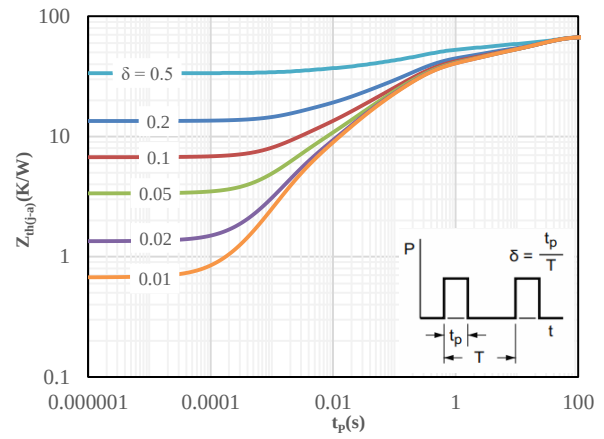
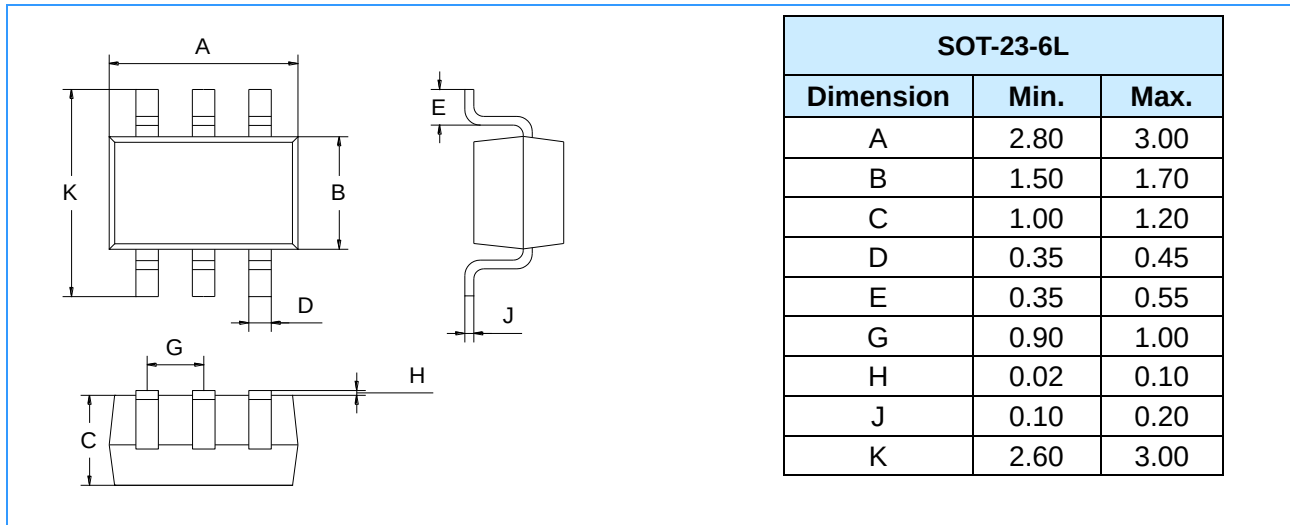
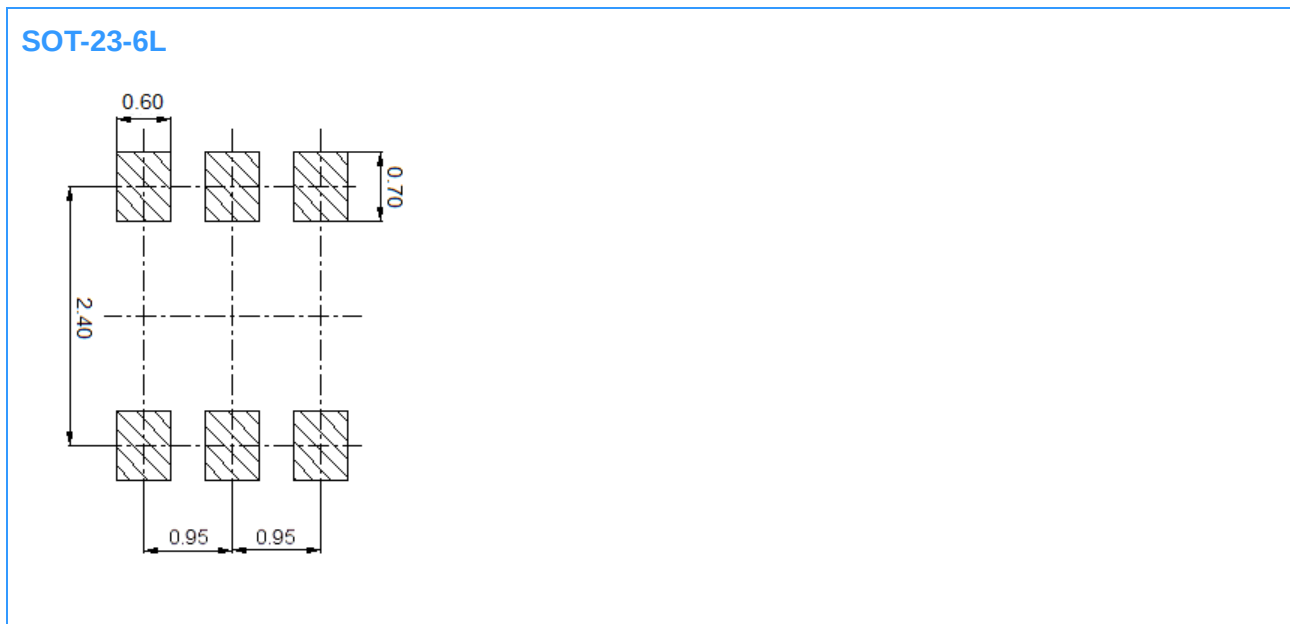


Fig 14 Transient Thermal Impedance

Package Outline Dimensions (Unit: mm)



Mounting Pad Layout (Unit: mm)



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