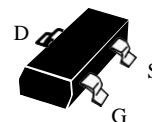


P-Channel High Density Trench MOSFET

Features:

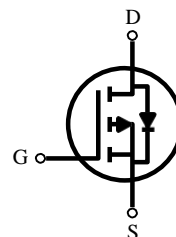
- Super high dense cell trench design for low $R_{DS(on)}$.
- Rugged and reliable.
- Surface Mount package.

SOT-23



PRODUCT SUMMARY

V_{DS}	I_D	$R_{DS(on)}$ (m-ohm) Max
-20V	-2.8	110 @ $V_{GS} = 4.5V$
	-2.0	140 @ $V_{GS} = 2.5V$



DEVICE MARKING

K2301 = 2301/ A1SHB

ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous ^a @ $T_A = 25\text{ }^\circ\text{C}$ -Pulse ^b	I_D	-2.8	A
	I_{DM}	-8	A
Drain-Source Diode Forward Current ^a	I_S	-0.75	A
Maximum Power Dissipation ^a	P_D	$T_A = 25\text{ }^\circ\text{C}$	1.25
		$T_A = 75\text{ }^\circ\text{C}$	0.75
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to 150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient ^a	R_{thJA}	100	$^\circ\text{C/W}$
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Note

a. Surface Mounted on FR4 Board, $t \leq 10\text{sec}$.

b. Pulse width limited by maximum junction temperature.

ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20V, V_{GS} = 0V$			-1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 8V, V_{DS} = 0V$			-100	nA
ON CHARACTERISTICS^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.45	-0.65	-0.95	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -2.8A$		90	110	m-ohm
		$V_{GS} = -2.5V, I_D = -2.0A$		110	140	m-ohm
DRAIN-SOURCE DIODE CHARACTERISTICS^b						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = -0.75A$			-1.2	V
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C_{ISS}	$V_{DS} = -6V, V_{GS} = 0V$ $f = 1.0MHz$		664		pF
Output Capacitance	C_{OSS}			154		pF
Reverse Transfer Capacitance	C_{RSS}			129		pF
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = -6V, I_D = -1A$ $V_{GEN} = -4.5V$		8.6		ns
Rise Time	t_r			3.0		ns
Turn-Off Delay Time	$t_{D(OFF)}$	$R_L = 6\text{ ohm}$ $R_{GEN} = 6\text{ ohm}$		39.2		ns
Fall Time	t_f			11.2		ns
Total Gate Charge	Q_g	$V_{DS} = -6V$ $I_D = -2.8A$ $V_{GS} = -4.5V$		6.72		nC
Gate-Source Charge	Q_{gs}			1.12		nC
Gate-Drain Charge	Q_{gd}			1.04		nC

Note

b. Pulse Test Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

c. Guaranteed by design, not subject to production testing.

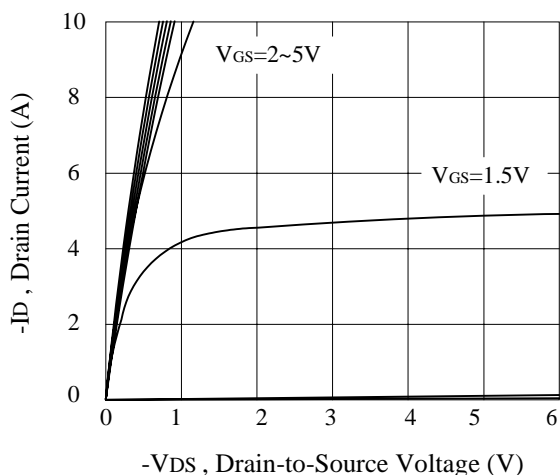


Figure 1. Output Characteristics

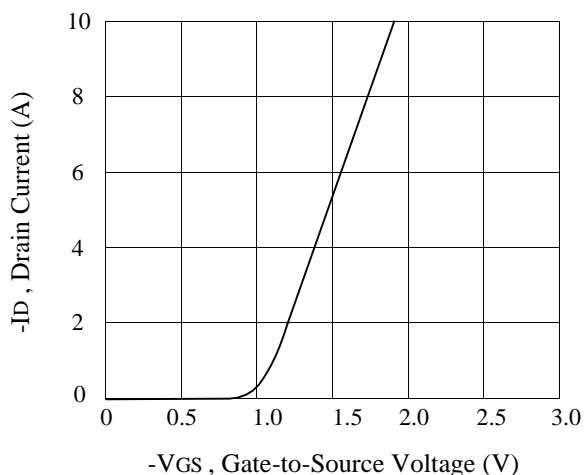


Figure 2. Transfer Characteristics

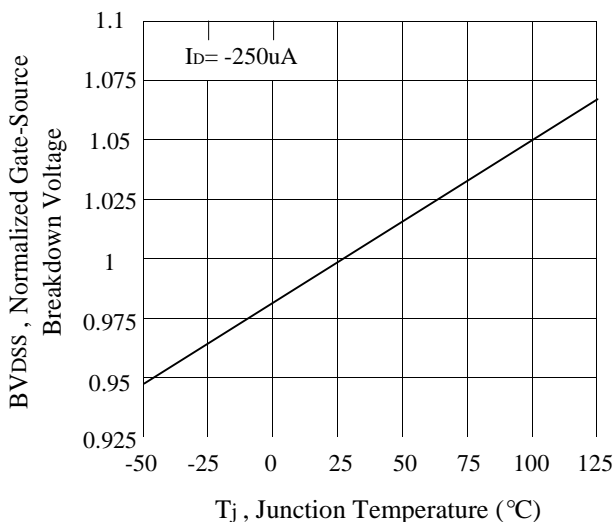


Figure 3. Breakdown Voltage Variation with Temperature

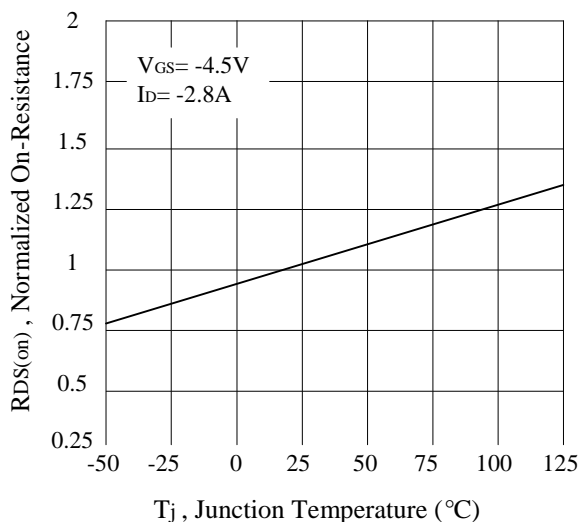


Figure 4. On-Resistance Variation with Temperature

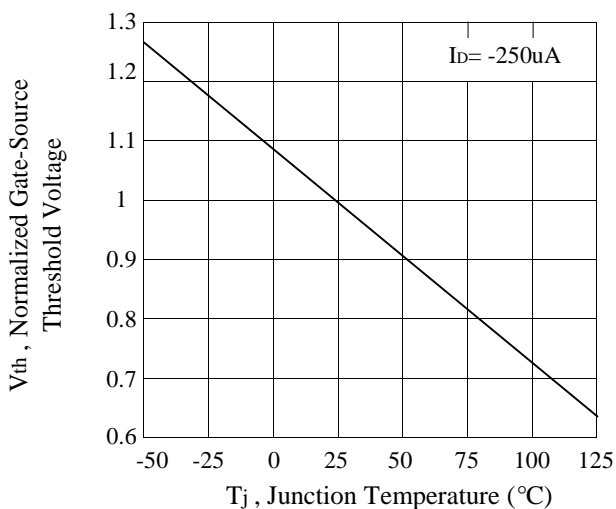


Figure 5. Gate Threshold Variation with Temperature

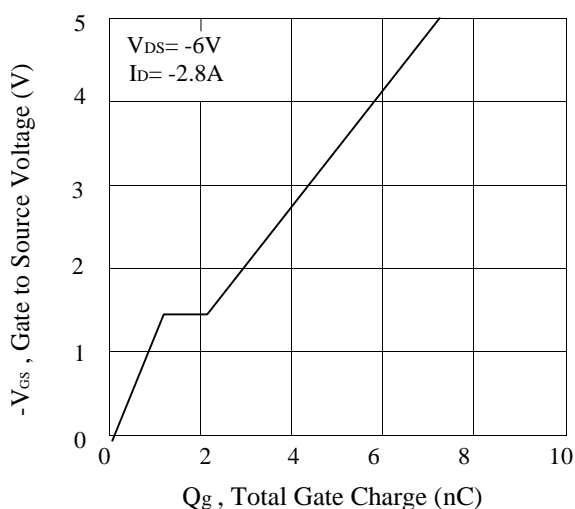
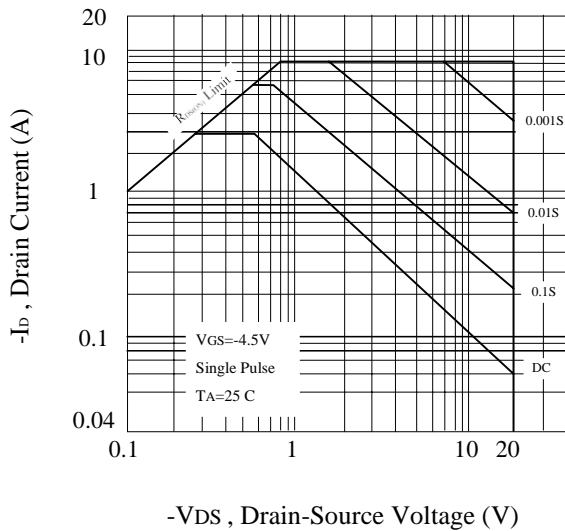
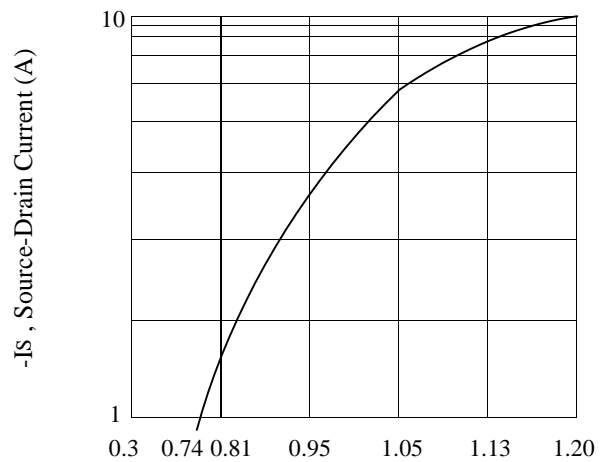


Figure 6. Gate Charge



-VDS, Drain-Source Voltage (V)
 Figure 7. Maximum Safe Operating Area



-VSD, Body Diode Forward Voltage (V)
 Figure 8. Body Diode Forward Voltage Variation with Source Current

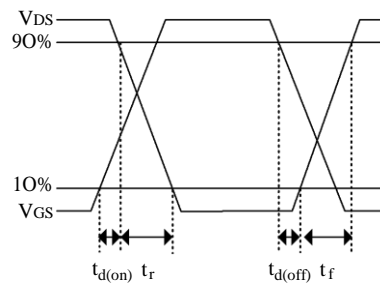
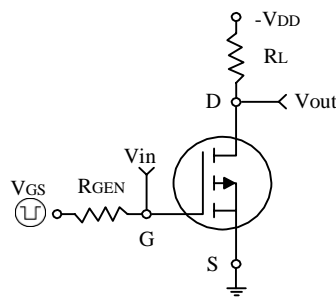


Figure 9. Switching Test Circuit and Switching Waveforms

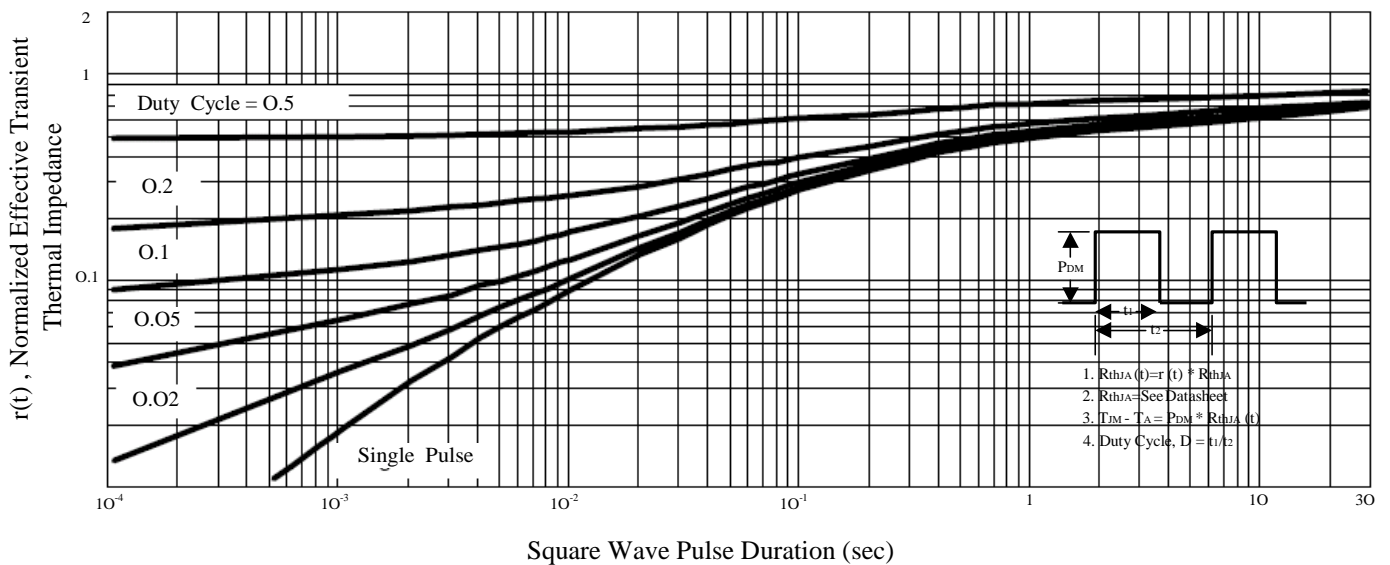
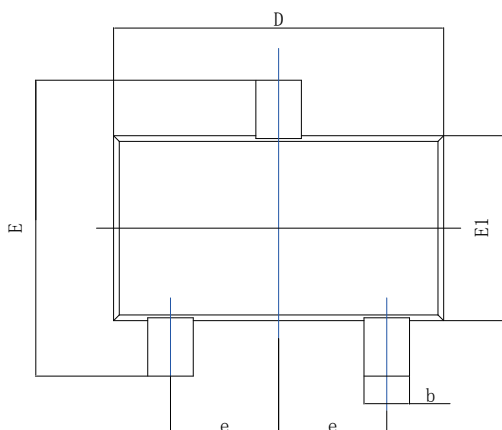
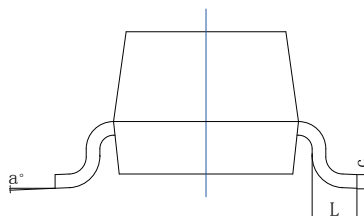
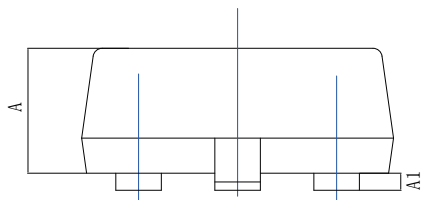


Figure 10. Normalized Thermal Transient Impedance Curve

SOT-23 Package Outline



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.35
A1	0.04	0.07	0.15
b	0.30	0.40	0.50
c	0.08	--	0.21
D	2.72	2.92	3.12
E	2.10	2.33	2.64
E1	1.10	1.30	1.50
e	0.95BSC		
L	0.20	--	0.60
a°	0°	--	8°