

P-Ch 20V Fast Switching MOSFETs

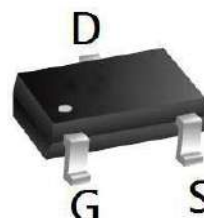
Features:

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent Cdv/dt effect decline
- ★ Advanced high cell density Trench technology

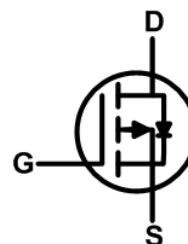
Description:

The KN2301S is the high cell density trench P-ch MOSFETs, which provides excellent RDS(on) and efficiency for most of the small power switching and load switch applications.

The KN2301S meet the RoHS and Green Product requirement with full function reliability approved.



SOT23S Pin Configuration



Product Summary

BVDSS	RDS(on)	ID
-20V	100mΩ	-3.3A

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-20	V
V _{GS}	Gate-Source Voltage	±12	V
I _D @T _A =25°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-3.3	A
I _D @T _A =70°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-2.6	A
I _{DM}	Pulsed Drain Current ²	-13	A
P _D @T _A =25°C	Total Power Dissipation ³	1.4	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-ambient ¹	---	125	°C/W
R _{θJA}	Thermal Resistance Junction-ambient ¹ (t≤10s)	---	90	°C/W

Electrical Characteristics ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-4.5V, I_D=-3A$	---	76	100	$m\Omega$
		$V_{GS}=-2.5V, I_D=-2A$	---	110	135	
		$V_{GS}=-1.8V, I_D=-0.9A$	---	160	240	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.45	-0.6	-1.0	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-16V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	-1	μA
		$V_{DS}=-16V, V_{GS}=0V, T_J=55^{\circ}\text{C}$	---	---	-5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	---	12.2	---	S
Q_g	Total Gate Charge (-4.5V)	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-3A$	---	10.1	---	nC
Q_{gs}	Gate-Source Charge		---	1.21	---	
Q_{gd}	Gate-Drain Charge		---	2.46	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=3.3\Omega$ $I_D=-3A$	---	5.6	---	ns
T_r	Rise Time		---	32.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	45.6	---	
T_f	Fall Time		---	29.2	---	
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	677	---	pF
C_{oss}	Output Capacitance		---	82	---	
C_{rss}	Reverse Transfer Capacitance		---	73	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	-3	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1	V

Note :

1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.

2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

3.The power dissipation is limited by 150 $^{\circ}\text{C}$ junction temperature

4.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

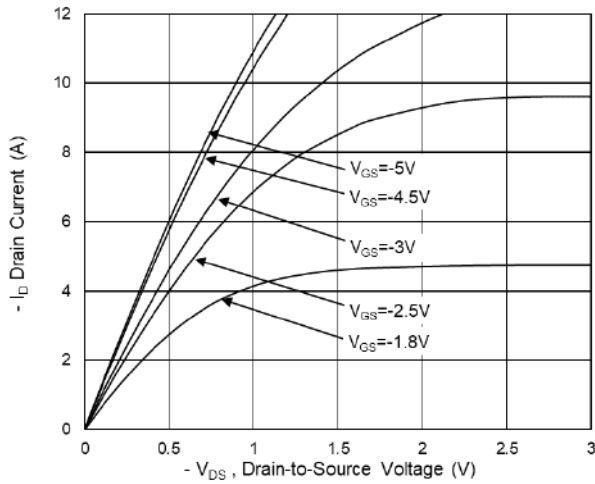


Fig.1 Typical Output Characteristics

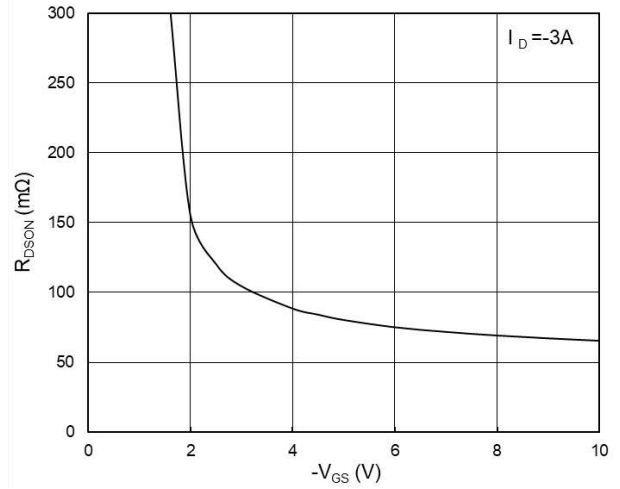


Fig.2 On-Resistance vs G-S Voltage

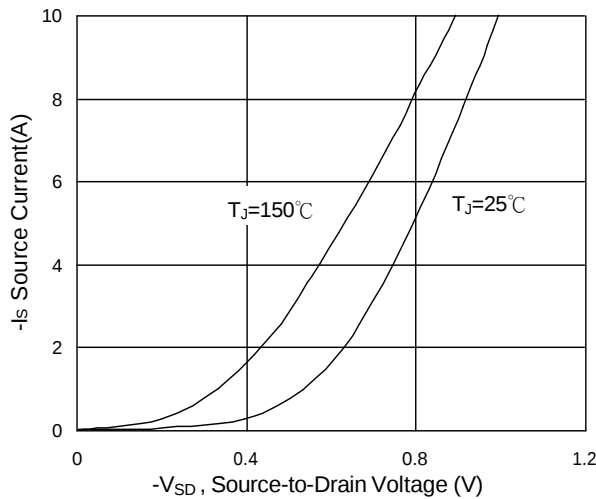


Fig.3 Source Drain Forward Characteristics

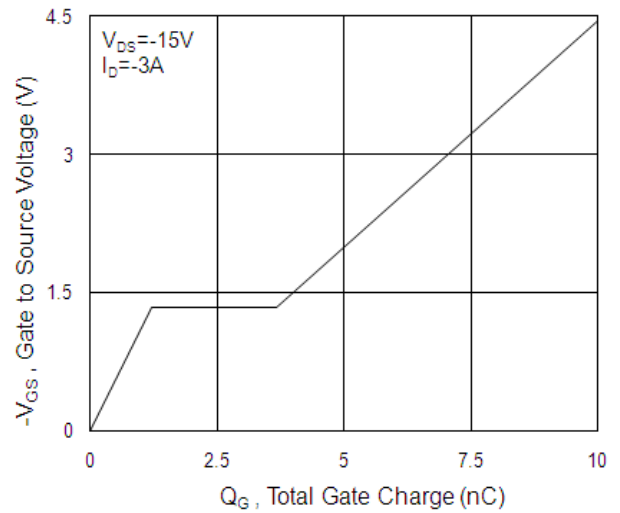


Fig.4 Gate-Charge Characteristics

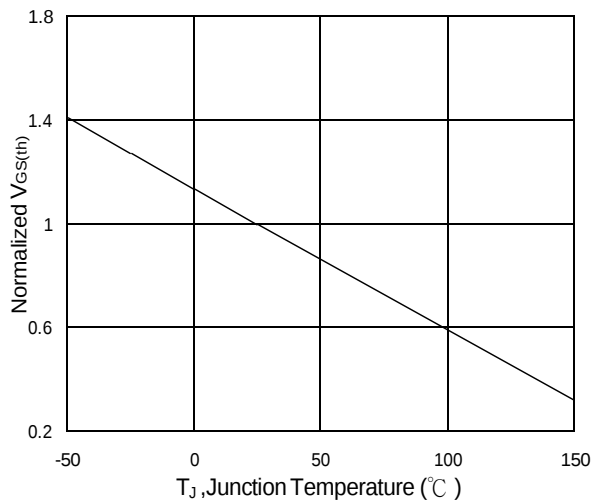


Fig.5 Normalized $V_{GS(th)}$ vs T_J

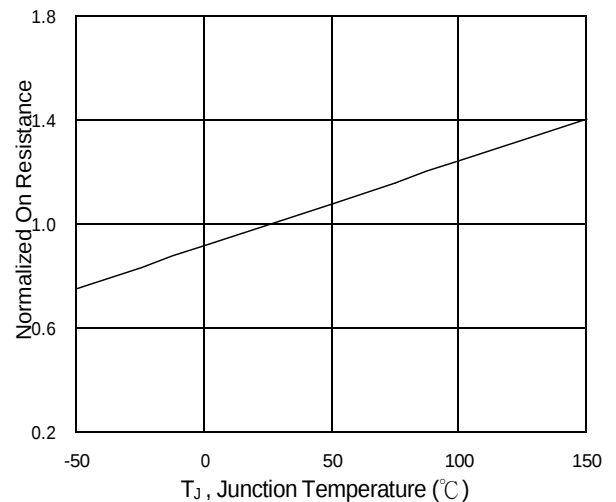


Fig.6 Normalized $R_{DS(on)}$ vs T_J

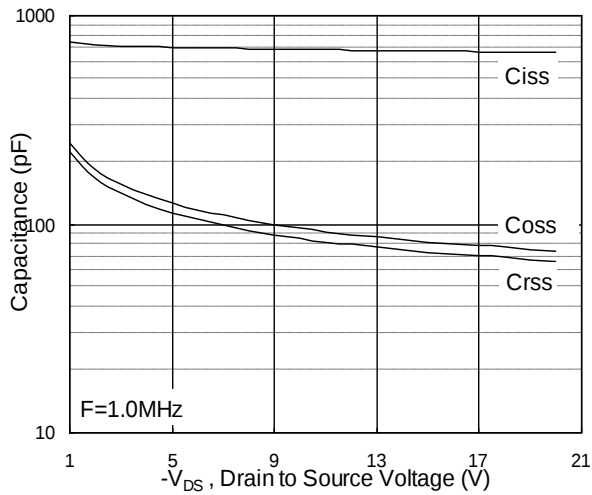


Fig.7 Capacitance

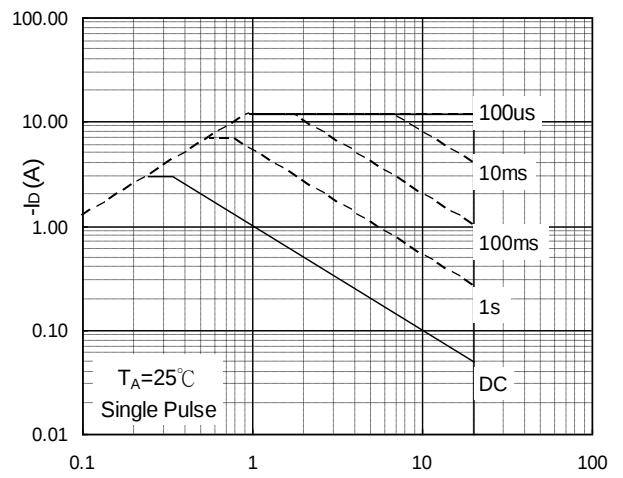


Fig.8 Safe Operating Area

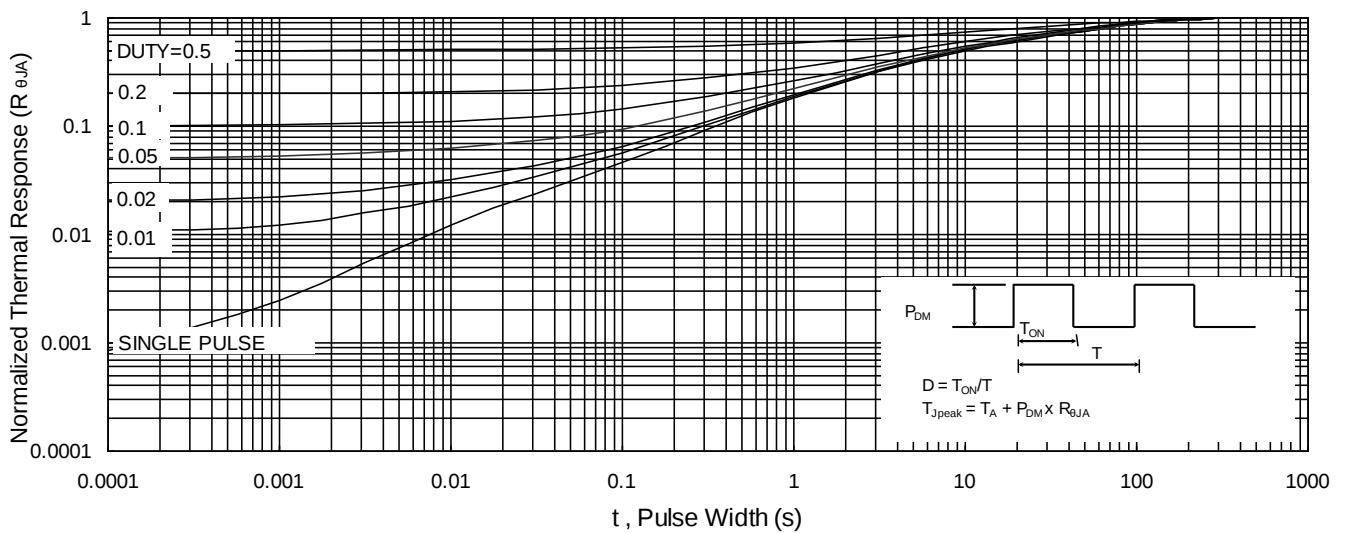


Fig.9 Normalized Maximum Transient Thermal Impedance

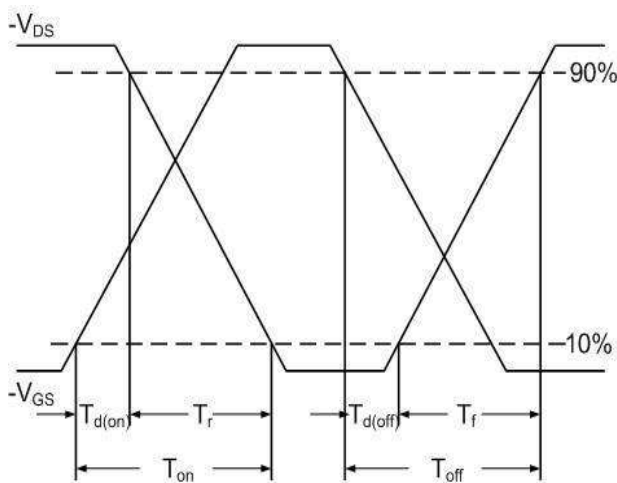


Fig.10 Switching Time Waveform

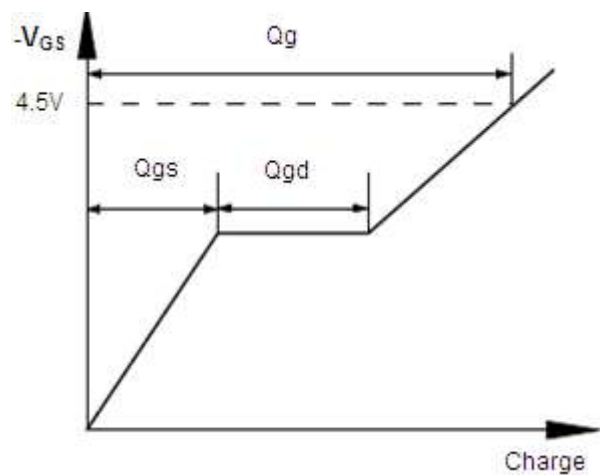


Fig.11 Gate Charge Waveform

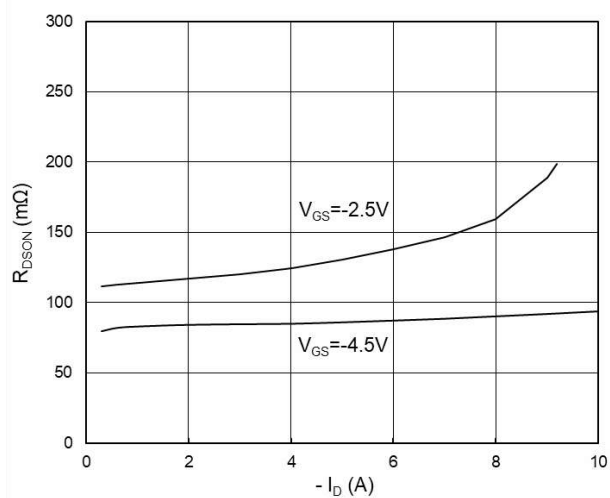


Fig.12 On-Resistance vs. Drain Current

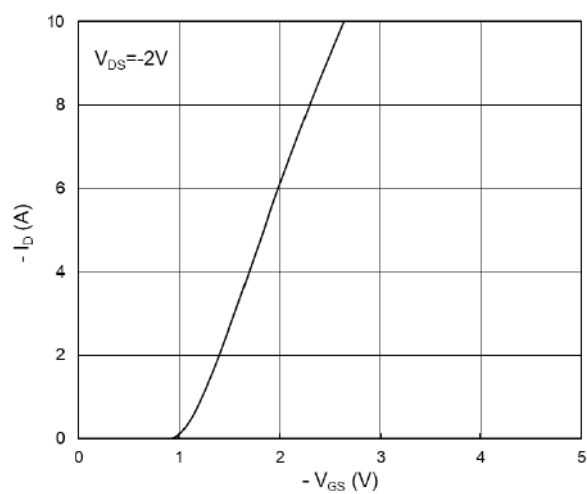
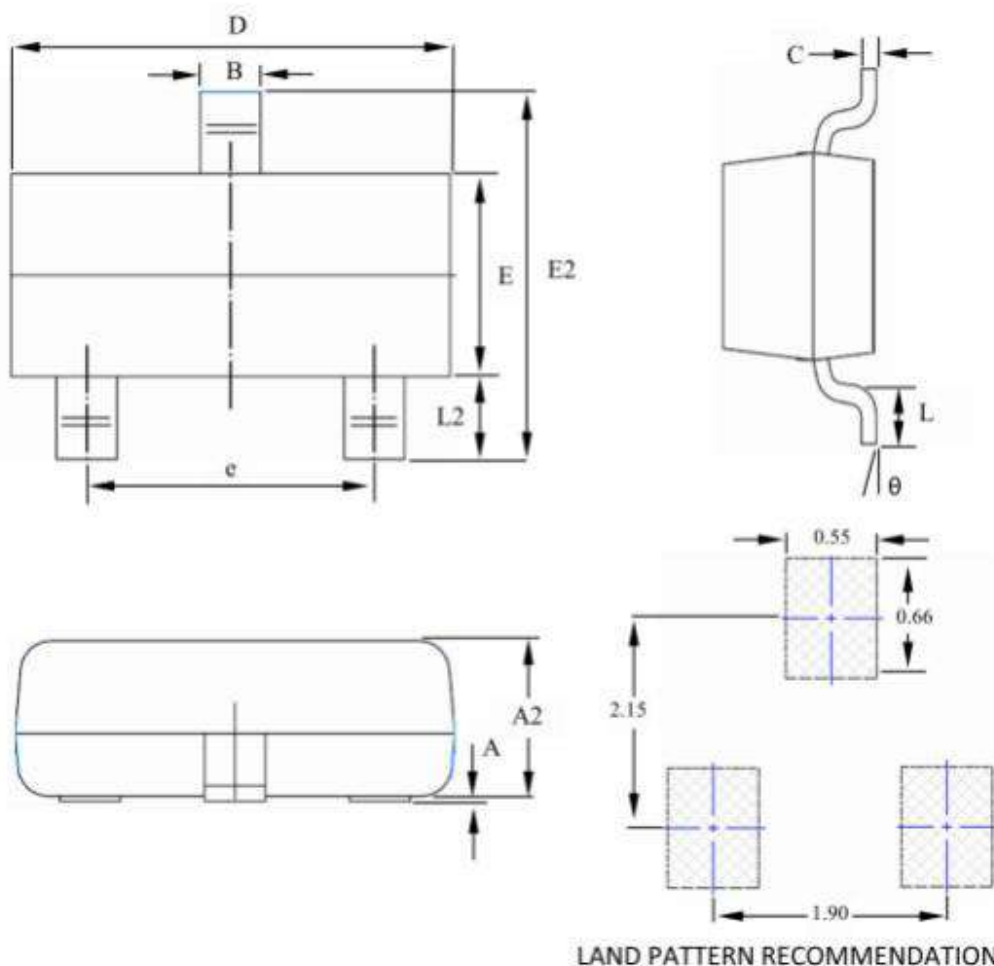


Fig.13 Transfer Characteristics

SOT23S Package Outline Dimensions



SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.00	--	0.10	0.000	--	0.004
A2	0.90	--	1.10	0.035	--	0.041
B	0.30	--	0.50	0.012	--	0.020
C	0.08	--	0.15	0.003	--	0.006
D	2.80	--	3.00	0.110	--	0.118
E	1.20	--	1.40	0.047	--	0.055
E2	2.25	--	2.55	0.089	--	0.100
L	0.30	--	0.50	0.012	--	0.020
L2	0.50	--	0.60	0.020	--	0.024
θ	0°	--	8°	0°	--	8°
e	1.80	--	2.00	0.071	--	0.079