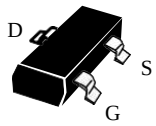
N-Channel High Density Trench MOSFET

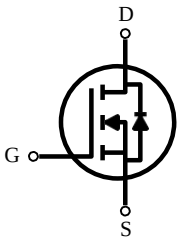
Features:

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

SOT-23



PRODUCT SUMMARY		
V_{DSS}	I_D	$R_{DS(on)}$ (m-ohm) Max
20V	3.0	65 @ V_{GS} = 4.5V
	2.0	90 @ V_{GS} = 2.5V



DEVICE MARKING

KNS2302 = 2302 / A2SHB

ABSOLUTE MAXIMUM RATINGS (T_A = 25 ℃ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	V
Drain Current-Continuous[a] @ T_A = 25 ℃		I_D	3	A
-Pulse[b]		I_{DM}	9	A
Drain-Source Diode Forward Current [a]		I_S	1	A
Maximum Power Dissipation [a]	T_A=25℃	P_D	1.25	W
	T_A=75℃		0.75	
Operating Junction and Storage Temperature Range		T_J,T_{STG}	- 55 to 150	℃

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient[a]	R_{thJA}	100	℃/W

Note
a. Surface Mounted on FR4 Board , t ≤ 10sec .
b. Pulse width limited by maximum junction temperature.

ELECTRICAL CHARACTERISTICS (T_A = 25 ℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ[c]	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V , I_D = 250uA	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V , V_{GS} = 0V			1	uA
Gate-Body Leakage	I_{GSS}	V_{GS} = ±8V , V_{DS} = 0V			±10	uA
ON CHARACTERISTICS[b]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250uA	0.5	0.7	1	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 4.5V , I_D = 2.8A		50	65	m-ohm
		V_{GS} = 2.5V , I_D = 2.0A		65	90	
Forward Transconductance	g_{fs}	V_{DS} = 5V , I_D = 4A		10.7		S
DRAIN-SOURCE DIODE CHARACTERISTICS[b]						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V , I_S = 1.7A			1.2	V
DYNAMIC CHARACTERISTICS[c]						
Input Capacitance	C_{ISS}	V_{DS} = 6V , V_{GS} = 0V f = 1.0MHz		457		pF
Output Capacitance	C_{OSS}			119		pF
Reverse Transfer Capacitance	C_{RSS}			93		pF
SWITCHING CHARACTERISTICS[c]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = 6V , I_D = 1A V_{GEN} = 4.5V R_L = 6 ohm R_{GEN} = 6 ohm		4	8	ns
Rise Time	t_r			14	26	ns
Turn-Off Delay Time	$t_{D(OFF)}$			21	39	ns
Fall Time	t_f			7.2		ns
Total Gate Charge	Q_g	V_{DS} = 6V I_D = 2.8A V_{GS} = 4.5V		13		nC
Gate-Source Charge	Q_{gs}			4.1		nC
Gate-Drain Charge	Q_{gd}			2.9		nC

Note
b. Pulse Test Pulse width ≤ 300us , Duty Cycle ≤ 2% .
c. Guaranteed by design , not subject to production testing.

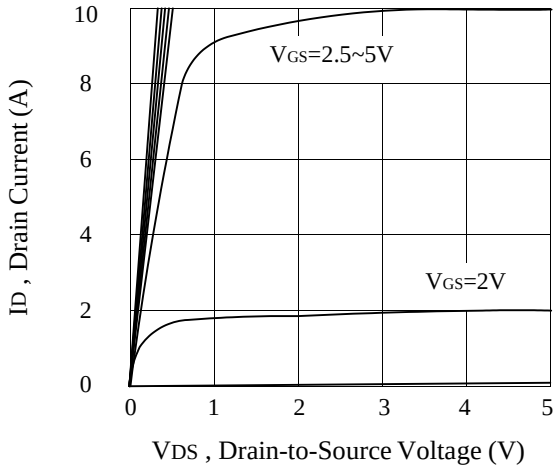


Figure 1. Output Characteristics

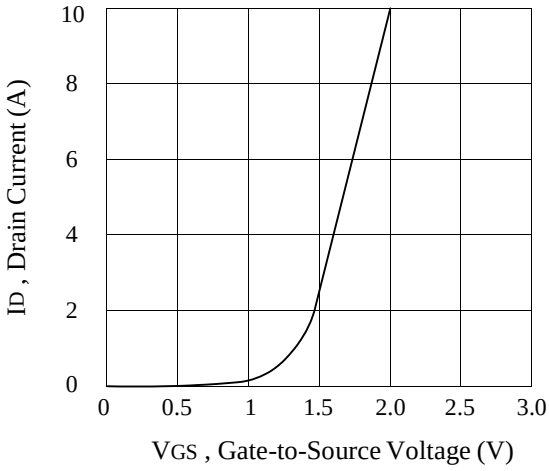


Figure 2. Transfer Characteristics

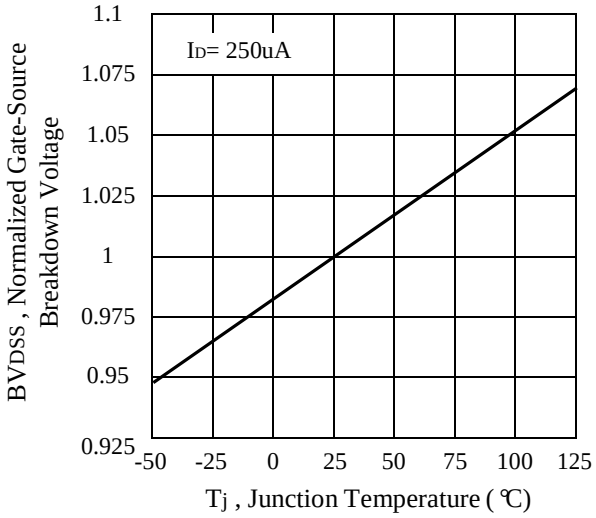


Figure 3. Breakdown Voltage Variation with Temperature

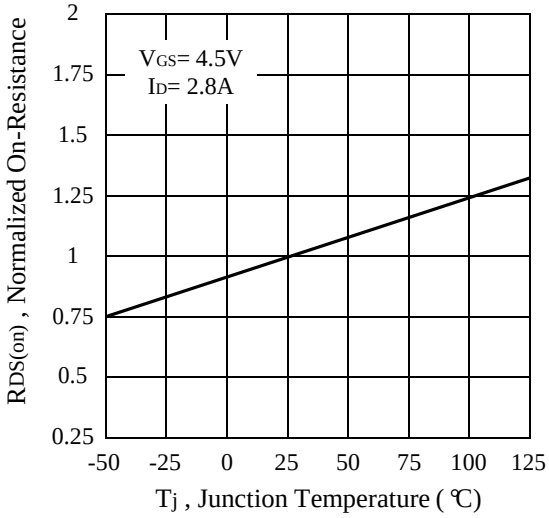


Figure 4. On-Resistance Variation with Temperature

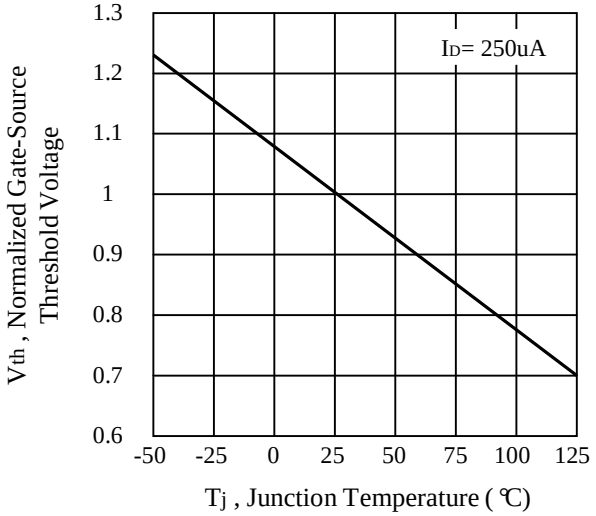


Figure 5. Gate Threshold Variation with Temperature

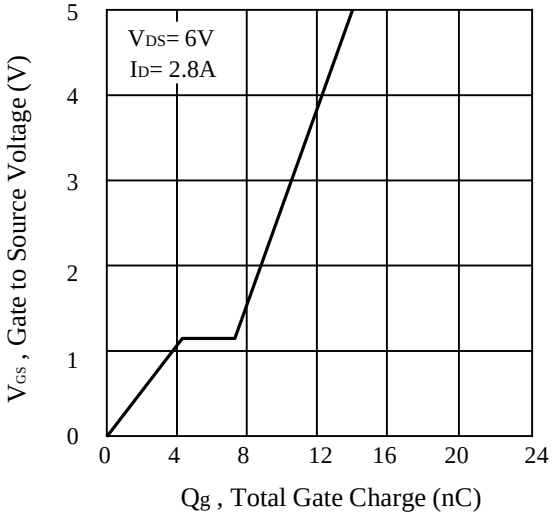


Figure 6. Gate Charge

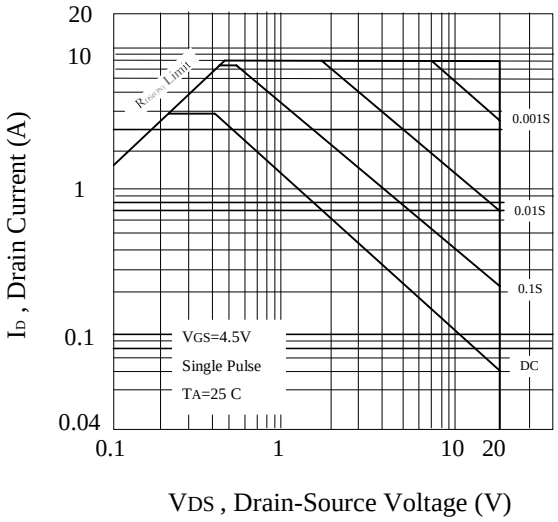


Figure 7. Maximum Safe Operating Area

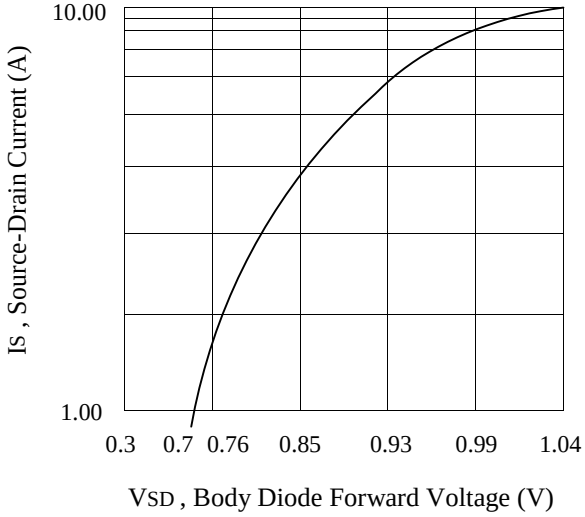


Figure 8. Body Diode Forward Voltage Variation with Source Current

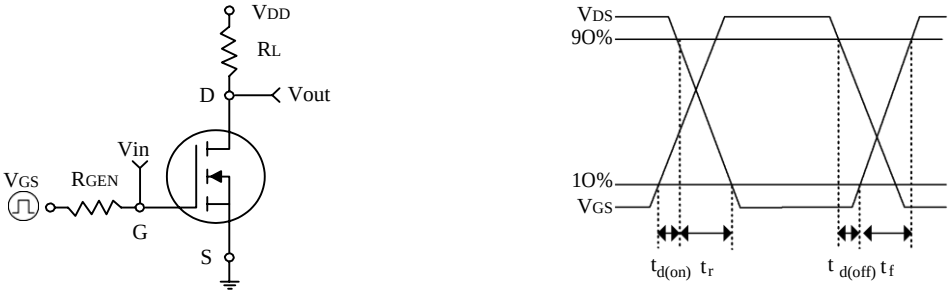
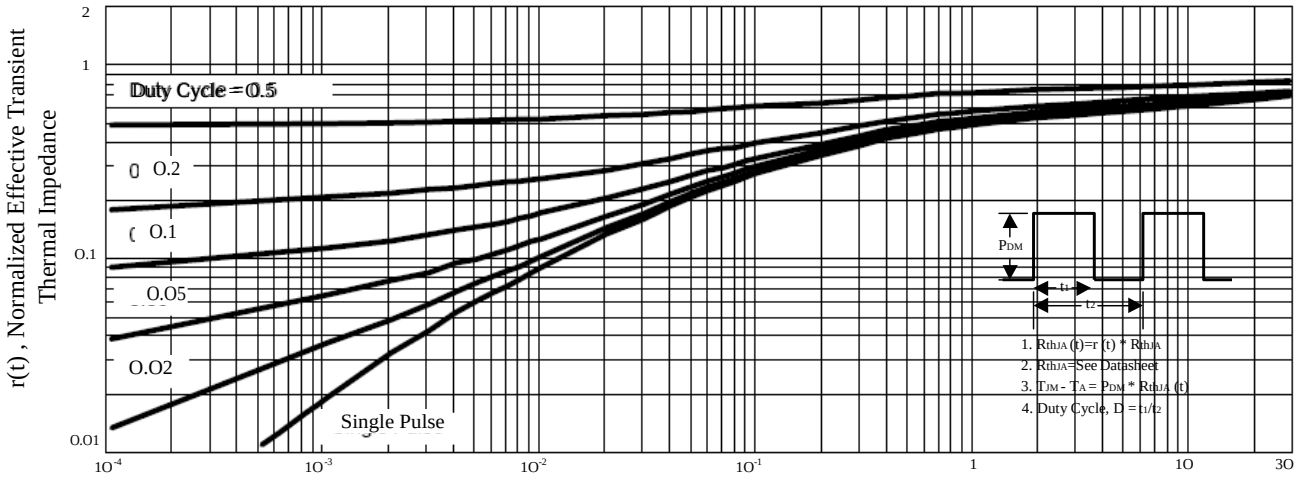


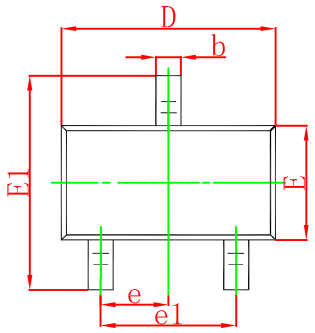
Figure 9. Switching Test Circuit and Switching Waveforms

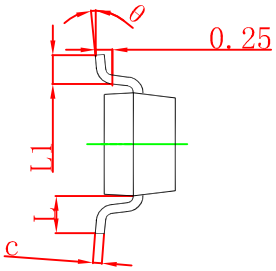


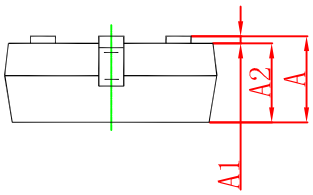
Square Wave Pulse Duration (sec)

Figure 10. Normalized Thermal Transient Impedance Curve

SOT-23 Package Outline Dimensions

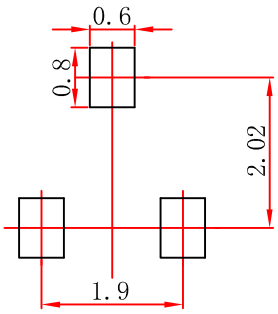






Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

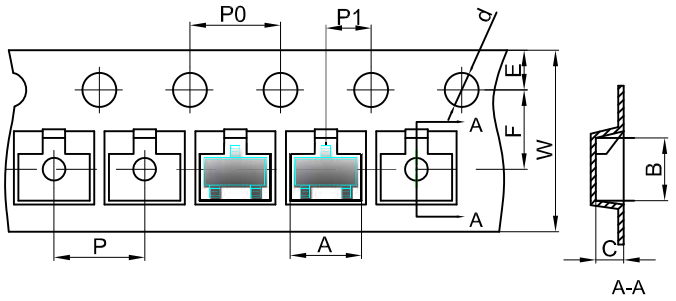
SOT-23 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only

SOT-23 Tape and Reel

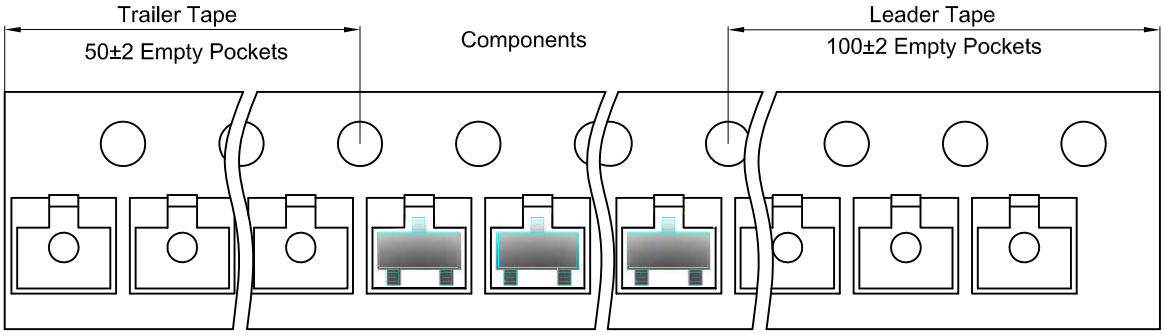
SOT-23 Embossed Carrier Tape



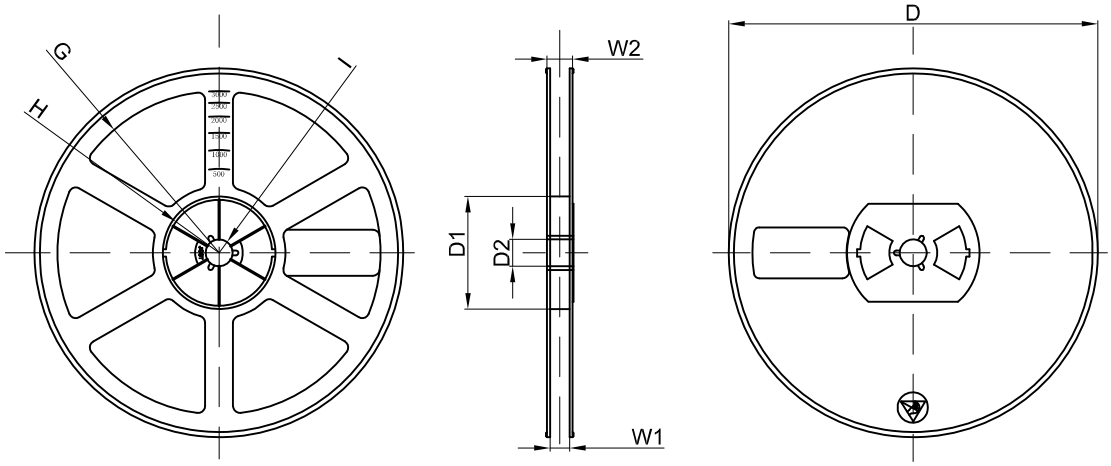
Packaging Description:
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23 Tape Leader and Trailer



SOT-23 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	