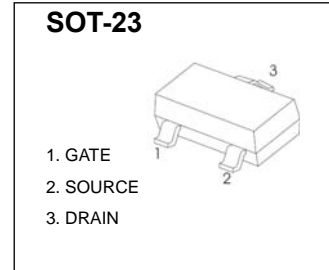


2309 P-Channel Enhancement Mode Field Effect Transistor

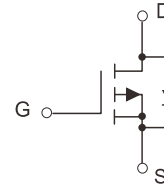
$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-60V	190mΩ@-10V	-2A
	240mΩ@-4.5V	



MARKING



Equivalent Circuit



Maximum ratings ($T_a=25^\circ\text{C}$ unless otherwise noted)

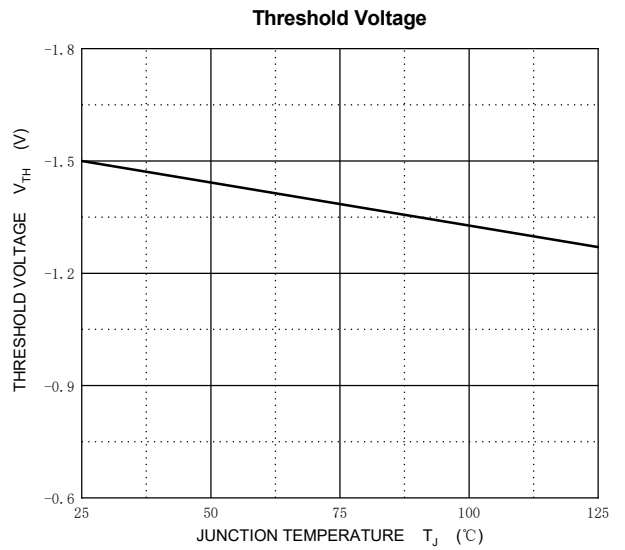
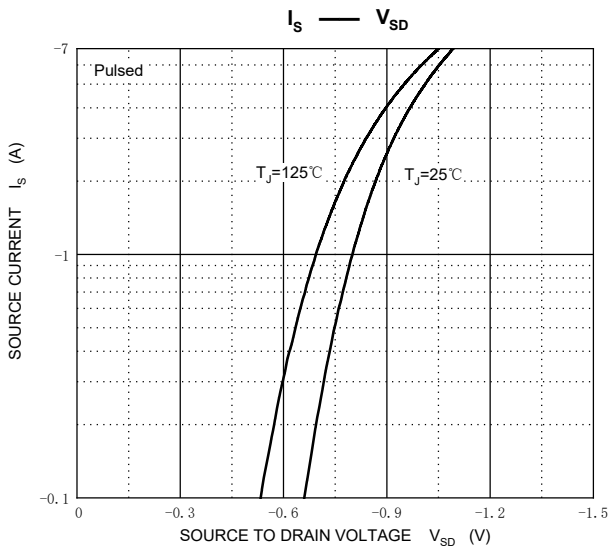
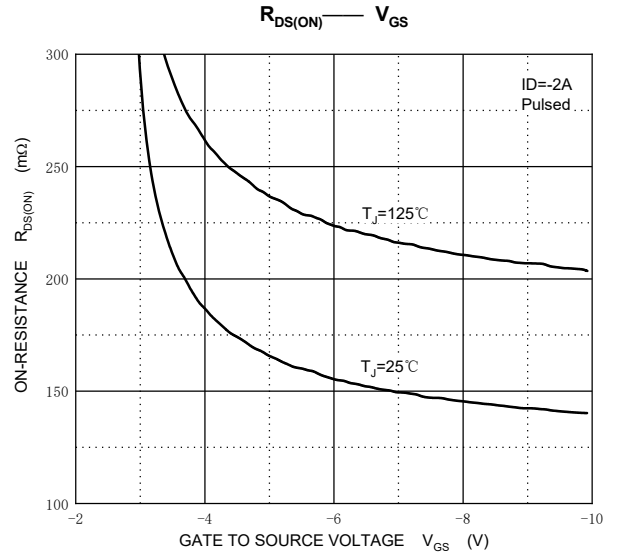
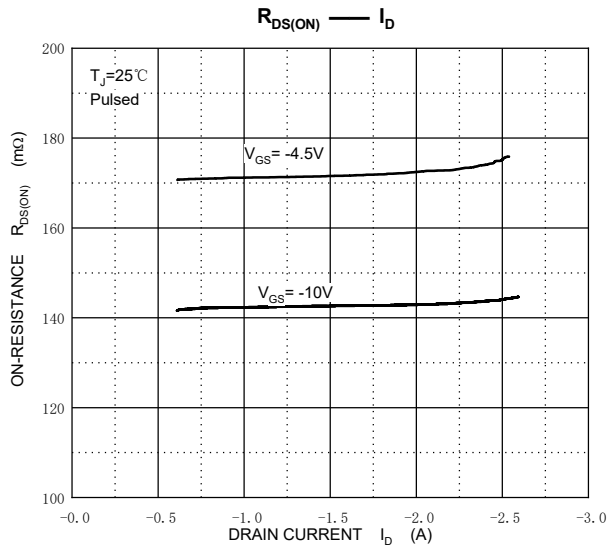
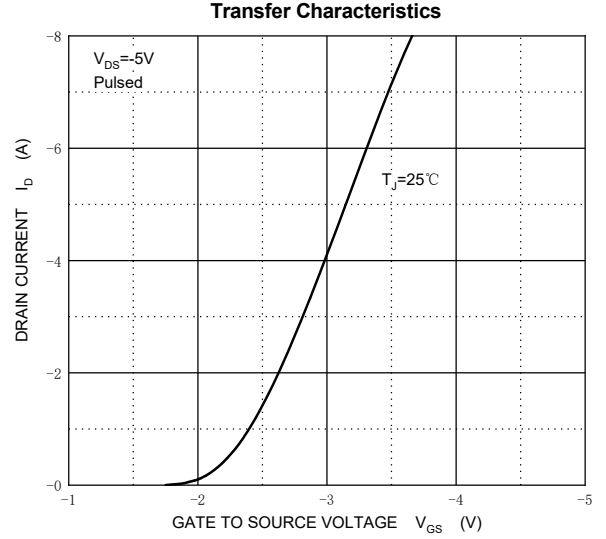
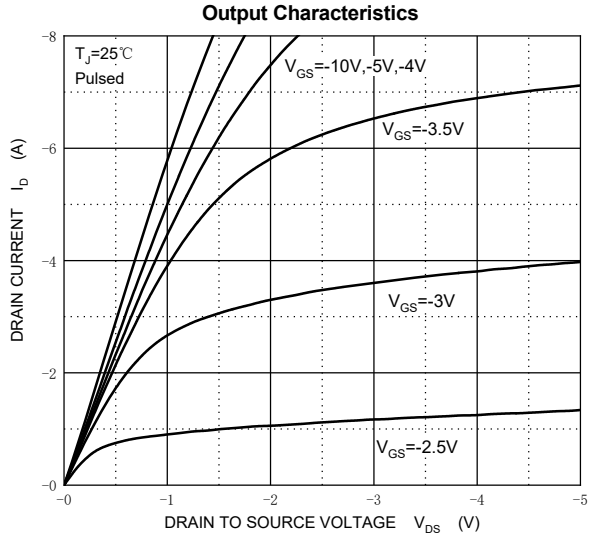
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current	I_D	-2	A
Pulsed Drain Current	I_{DM}	-8	
Power Dissipation	$P_D^{(4)}$	1.56	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}^{(4)}$	80	$^\circ\text{C}/\text{W}$
Operation Junction and Storage Temperature Range	T_J, T_{stg}	-55 ~ +150	$^\circ\text{C}$

T_a=25 °C unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-source breakdown voltage	V _{(BR) DSS}	V _{GS} = 0V, I _D = -250μA	-60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = -60V, V _{GS} = 0V, T _J = 25 °C			-1	μA
		V _{DS} = -60V, V _{GS} = 0V, T _J = 125 °C			-1	mA
Gate-source leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
On characteristics						
Drain-source on-resistance ^②	R _{DS(on)}	V _{GS} = -10V, I _D = -2A		145	190	mΩ
		V _{GS} = -4.5V, I _D = -1.5A		172	240	mΩ
Forward transconductance	g _{FS}	V _{DS} = -10V, I _D = -2A		3.5		S
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.2	-1.5	-2.5	V
Dynamic Characteristics^③						
Input capacitance	C _{iss}	V _{DS} = -30V, V _{GS} = 0V, f = 1MHz		425	615	pF
Output capacitance	C _{oss}			35	50	pF
Reverse transfer capacitance	C _{rss}			20	30	pF
Gate resistance	R _g	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz		17		Ω
Switching Characteristics^③						
Turn-on delay time	t _{d(on)}	V _{GS} = -10V, V _{DD} = -30V, I _D = -1A, R _G = 6Ω		5.2	10	ns
Turn-on rise time	t _r			19	36	ns
Turn-off delay time	t _{d(off)}			35	67	ns
Turn-off fall time	t _f			10.6	20	ns
Total Gate Charge	Q _g	V _{DS} = -30V, I _D = -2A, V _{GS} = -10V		8.2	12	nC
Gate-Source Charge	Q _{gs}			1.8	3.6	nC
Gate-Drain Charge	Q _{gd}			1.5	3	nC
Drain-source diode characteristics and maximum ratings						
Diode forward voltage ^②	V _{SD}	I _S = -1A, V _{GS} = 0V		-0.83	-1	V
Continuous drain-source diode forward current	I _S				-2	A
Pulsed drain-source diode forward current ^①	I _{SM}				-8	A

Notes:

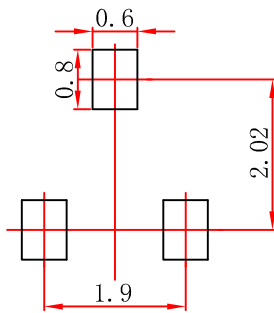
- 1.Repetitive Rating : Pulse width limited by maximum junction temperature.
- 2.Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- 3.Guaranteed by design, not subject to production testing.
- 4.The value of RθJA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_a = 25 °C.





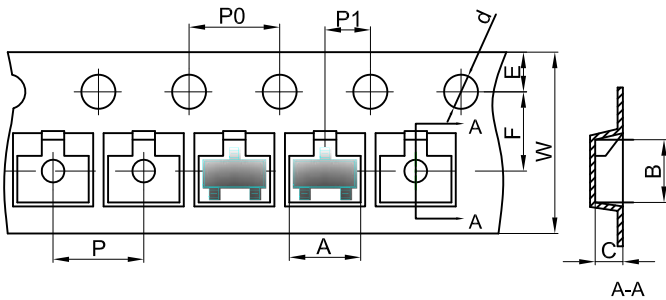
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 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



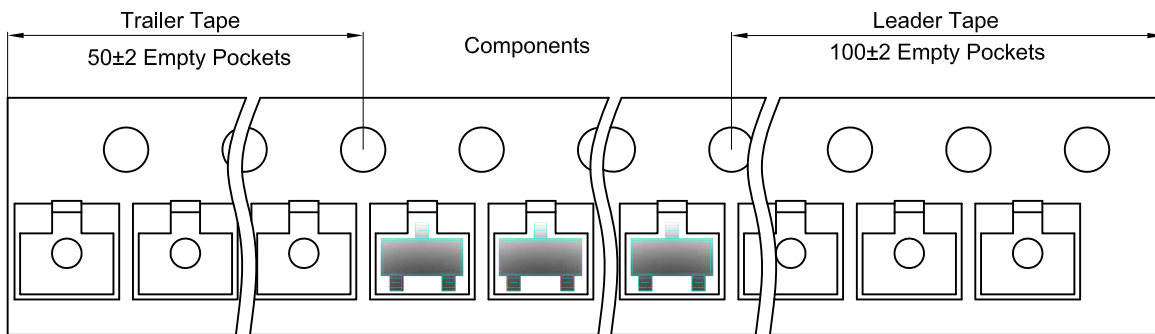
- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.

SOT-23 Embossed Carrier Tape

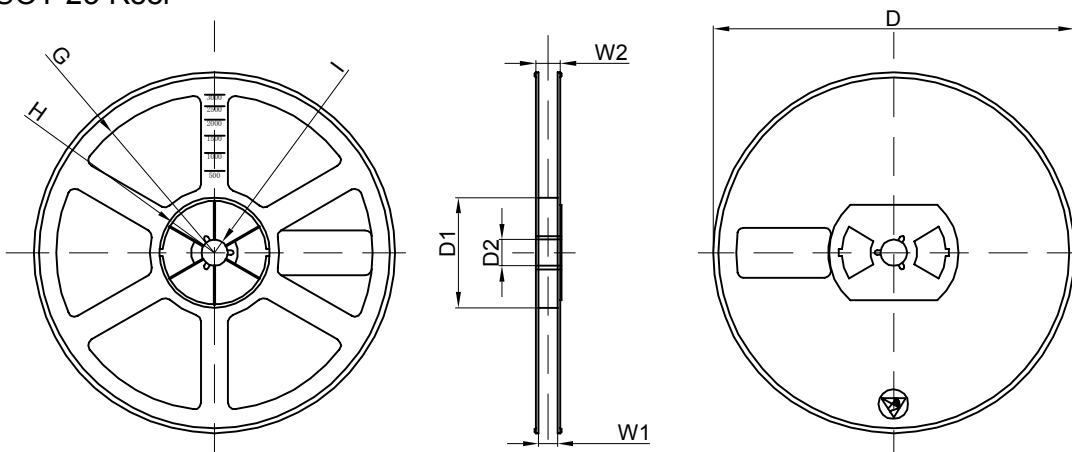


Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

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
3000 pcs	7 inch	3000 pcs