

SuperMOS – SOT-23 20V BV_{DSS},23mΩ R_{DS(on)}, N-channel MOSFET

1. Description

The ES2300 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ES2300 is Pb-free.

2. Features

- 20V, R_{DS(ON)}=23.0mΩ(Typ), V_{GS}=4.5V
R_{DS(ON)}=30.5mΩ(Typ), V_{GS}=2.5V
 - Use trench MOSFET technology
 - High density cell design for low R_{DS(on)}
- Material: Halogen free
 - Reliable and rugged
 - Avalanche Rated
 - Low leakage current

3. Applications

- PWM applications
 - Load switch
- Power management in portable/desktop PCs
 - DC/DC conversion

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ES2300	SOT-23	2300	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

Table-1 Ordering information

5. Pin Configuration and Functions

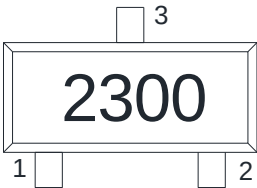
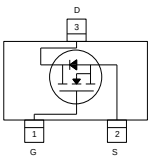
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	BV_{DSS}	20	V
Gate-Source Voltage	V_{GS}	±10	V
Continuous Drain Current	I_D	4.5	A
Maximum Power Dissipation	P_D	1	W
Pulsed Drain Current ^a	I_{DM}	18	A
Operating Junction Temperature	T_J	150	°C
Lead Temperature	T_L	260	°C
Storage Temperature Range	T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10 \text{ s}$	$R_{\theta JA}$	100	125	°C/W

Note:

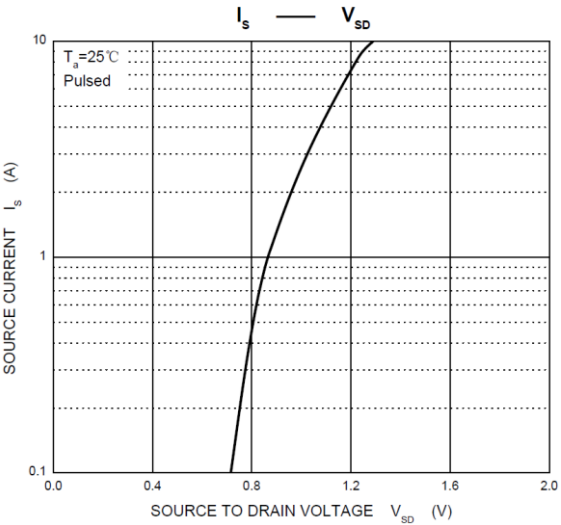
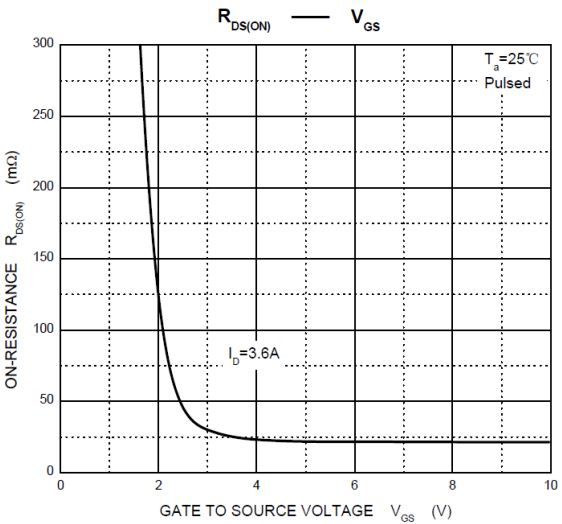
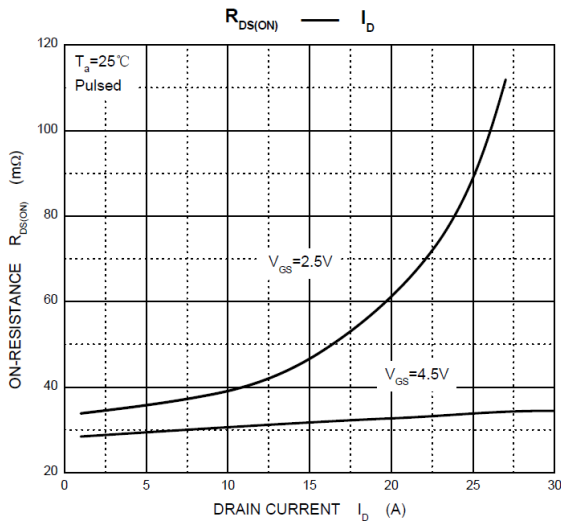
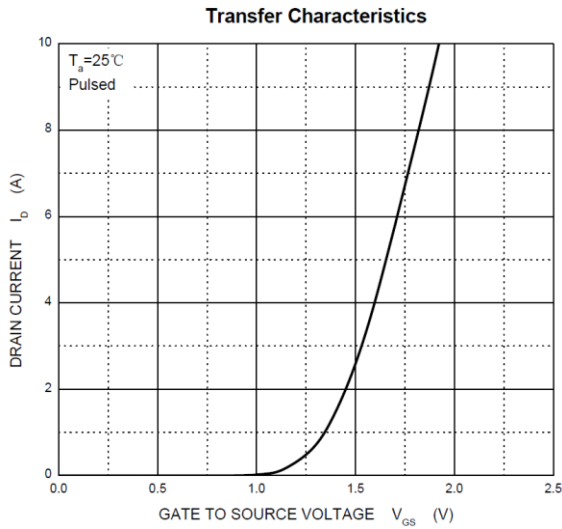
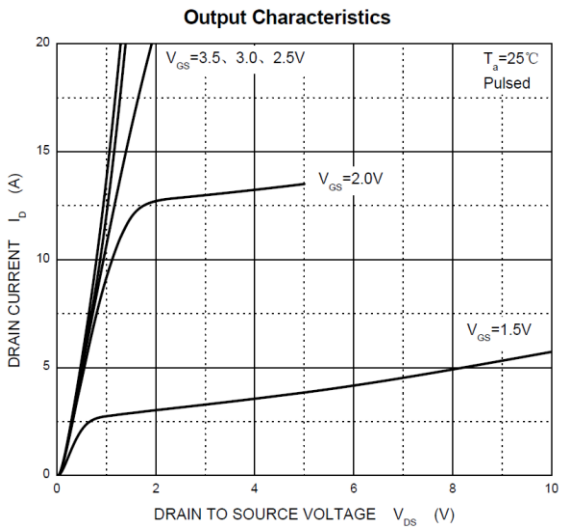
a: Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

Electrical Characteristics

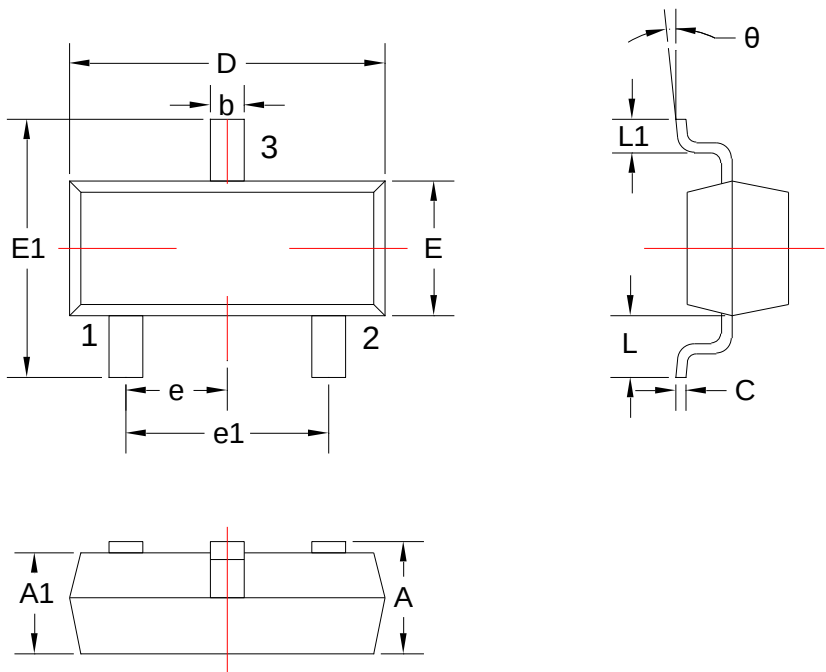
At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-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-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±10V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	0.45	0.7	1.1	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =3.6A		23.0	33.0	mΩ
		V _{GS} =2.5V, I _D =3.0A		30.5	45.0	
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =4.5A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =10V		311		pF
Output Capacitance	C _{OSS}			125		
Reverse Transfer Capacitance	C _{RSS}			88		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =4.5V, V _{DS} =10V, I _D =3.6A		4.1	10.5	nC
Gate-to-Source Charge	Q _{GS}			0.68		
Gate-to-Drain Charge	Q _{GD}			1.55		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =4.5V, V _{DS} =10V, R _L =55Ω, R _G =6Ω		7.2	15	ns
Rise Time	t _r			58.0	80	
Turn-Off Delay Time	t _{d(OFF)}			15.8	62	
Fall Time	t _f			10.6	25	
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.0A		0.75	1.25	V

7. Typical Characteristic



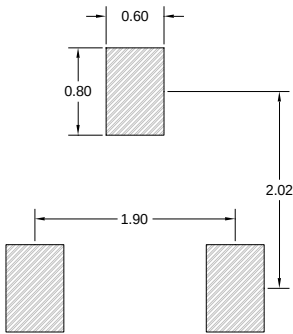
8. Dimension (SOT-23)



Unit: mm

Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	0.900	1.150	E1	2.250	2.550
A1	0.900	1.050	e	0.950TYP	
b	0.300	0.500	e1	1.800	2.000
c	0.080	0.150	L	0.550REF	
D	2.800	3.00	L1	0.300	0.500
E	1.200	1.400	θ	0°	8°

Table-5 Product dimensions in millimeter



Note:

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

Unit: mm

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