

SuperMOS –SOT-323 20V BV_{DSS} , 37m Ω $R_{DS(ON)}$, N-channel MOSFET

1. Description

The ES2102EI 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 ES2102EI is Pb-free.

2. Features

- 20V, $R_{DS(ON)}= 37m\Omega(Typ.) @V_{GS}=4.5V$
 $R_{DS(ON)}= 47m\Omega(Typ.) @V_{GS}=2.5V$
- Use trench MOSFET technology
- High density cell design for low $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

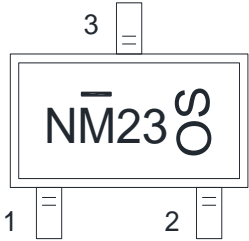
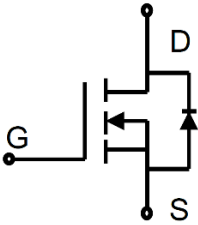
3. Applications

- 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
ES2102EI	SOT-323	NM23/OS	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

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}	± 12	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	4.5
		$T_A=75^\circ\text{C}$	3.8
Maximum Power Dissipation	P_D	1.4	W
Pulsed Drain Current	I_{DM}	18	A
Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Lead Temperature	T_L	260	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to 150	$^\circ\text{C}$

Thermal resistance ratings

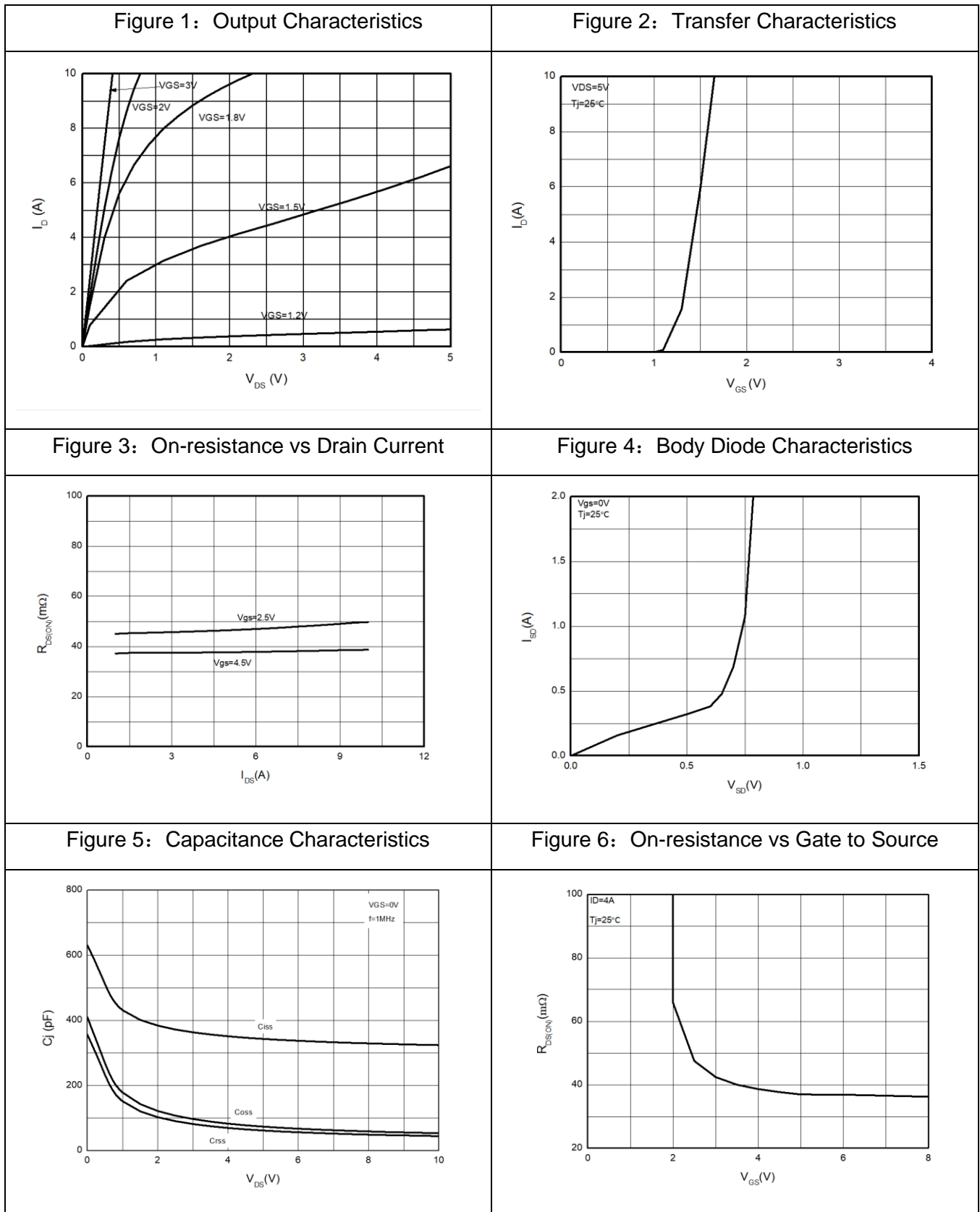
Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$R_{\theta JA}$		90	$^\circ\text{C/W}$

Electrical Characteristics

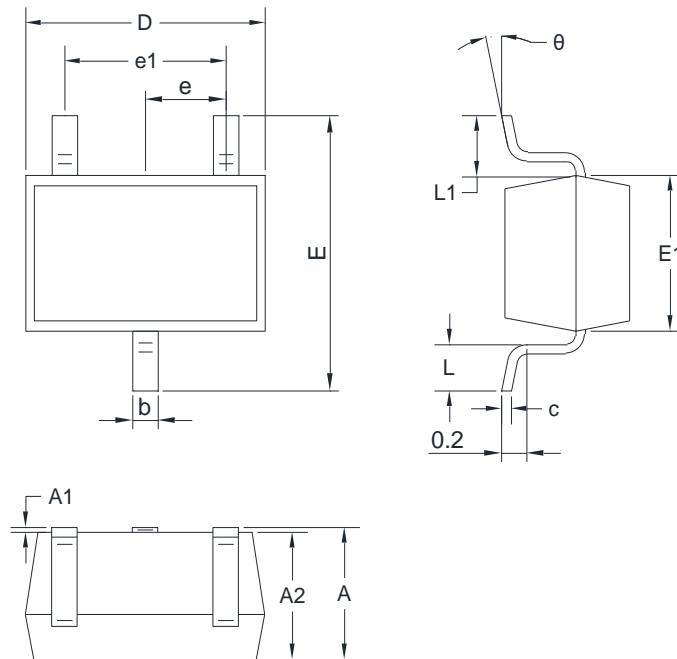
At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$			100	nA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	0.4	0.7	1.2	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=4A$		37	70	mΩ
		$V_{GS}=2.5V, I_D=3A$		47	80	
Forward transconductance	g_{fs}	$V_{DS}=5V, I_D=2.5A$	1		20	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz, V_{DS}=10V$		323		pF
Output Capacitance	C_{OSS}			53		
Reverse Transfer Capacitance	C_{RSS}			44		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=4.5V, V_{DS}=10V, I_D=4.0A$		6.5		nC
Gate-to-Source Charge	Q_{GS}			1		
Gate-to-Drain Charge	Q_{GD}			2.5		
Gate Resistance	R_g	$f=1MHz$		2.0		Ω
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=5V, V_{DD}=10V, I_D=1.0A, R_G=3.3\Omega$		9		ns
Rise Time	t_r			12		
Turn-Off Delay Time	$t_{d(OFF)}$			16		
Fall Time	t_f			5		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A$			1.2	V

7. Typical Characteristic



8. Dimension (SOT-323)



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.90	1.10	0.035	0.043
A1	0.00	0.10	0.000	0.004
A2	0.90	1.00	0.035	0.039
b	0.20	0.40	0.008	0.016
c	0.08	0.15	0.003	0.006
D	2.00	2.20	0.079	0.087
E	2.15	2.45	0.085	0.096
E1	1.150	1.350	0.045	0.053
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.260	0.460	0.100	0.018
L1	0.525 REF		0.021 REF	
θ	0°	8°	0°	8°

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