

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

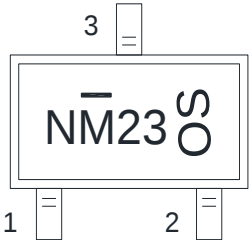
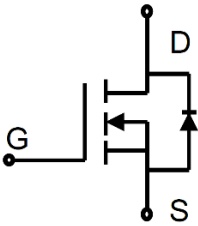
3. Applications

- 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	$T_A=25^{\circ}\text{C}$	I_D	4.5	A
	$T_A=75^{\circ}\text{C}$		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

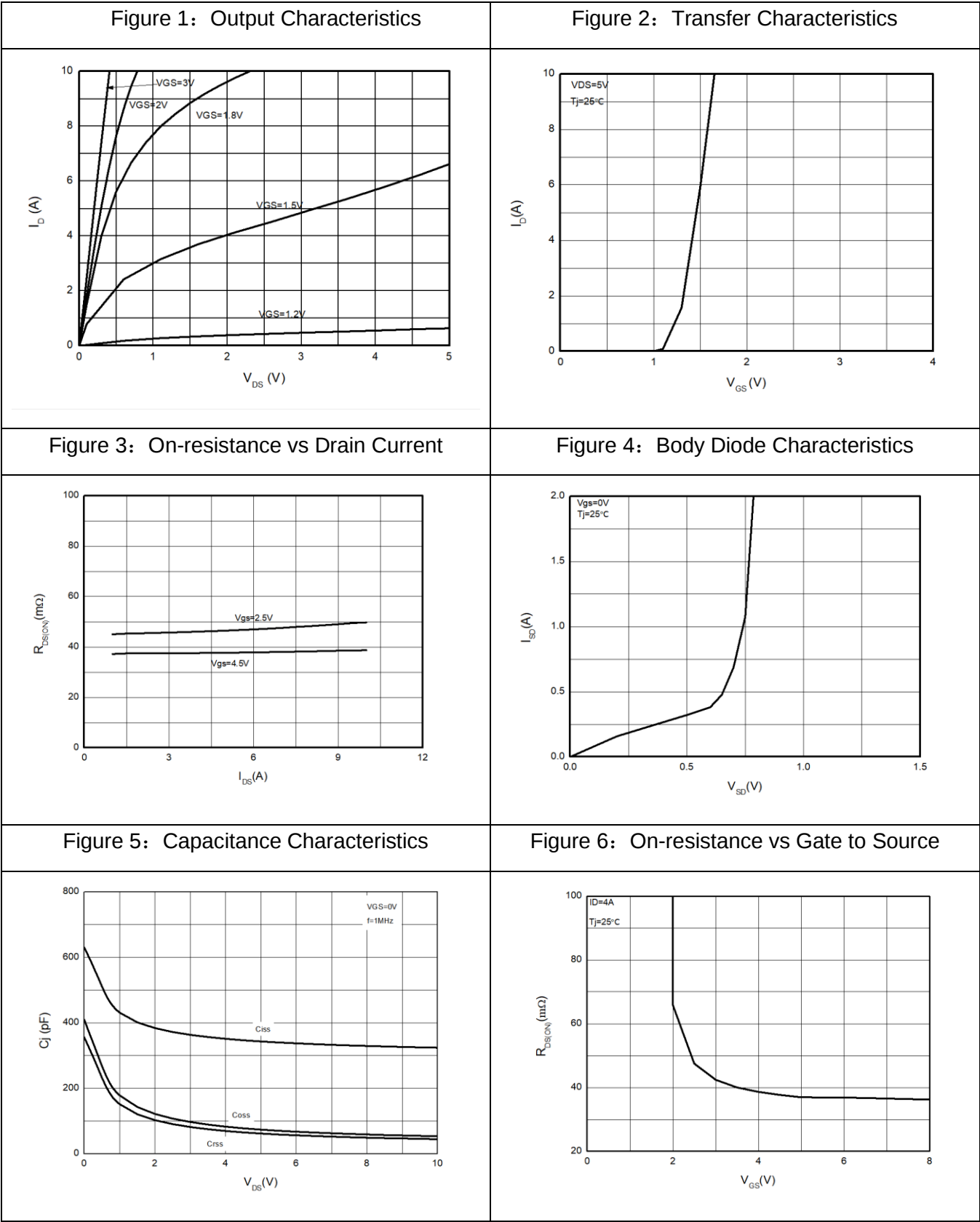
Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$R_{\theta JA}$		90	$^{\circ}\text{C/W}$

Electrical Characteristics

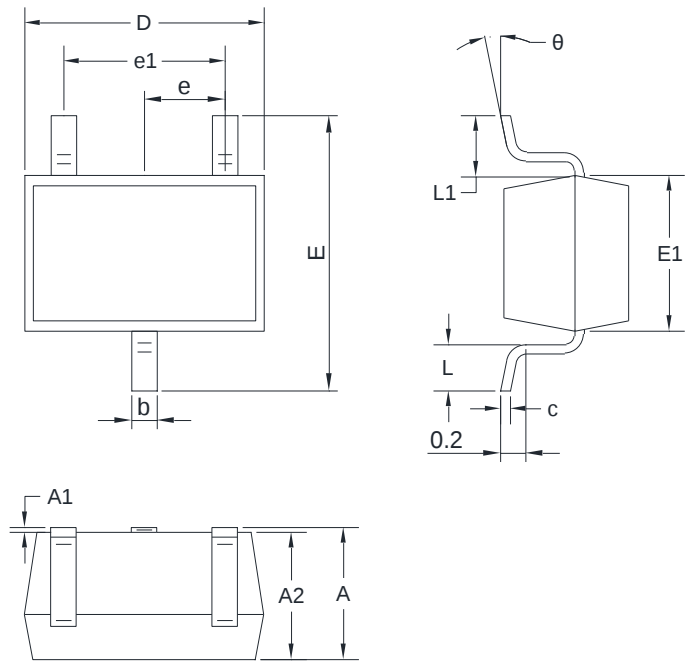
At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	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} =±12V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	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 =3.3Ω		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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