

SuperMOS – SOT-23 20V BV_{DSS} , 36m Ω $R_{DS(on)}$, 3.5A I_D , N-channel MOSFET

1. Description

The NCE2302-ES 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 NCE2302-ES is Pb-free.

2. Features

- 20V, $R_{DS(ON)}$ =36m Ω (Typ), V_{GS} =4.5V
 $R_{DS(ON)}$ =47m Ω (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
NCE2302-ES	SOT-23	2302	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

Table-1 Ordering information

5. Pin Configuration and Functions

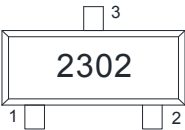
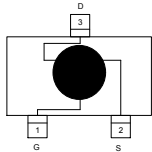
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

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	3.5	A
Maximum Power Dissipation	P_D	0.4	W
Pulsed Drain Current ^a	I_{DM}	14	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	$t \leq 10$ s	$R_{\theta JA}$		312.5	°C/W

Note:

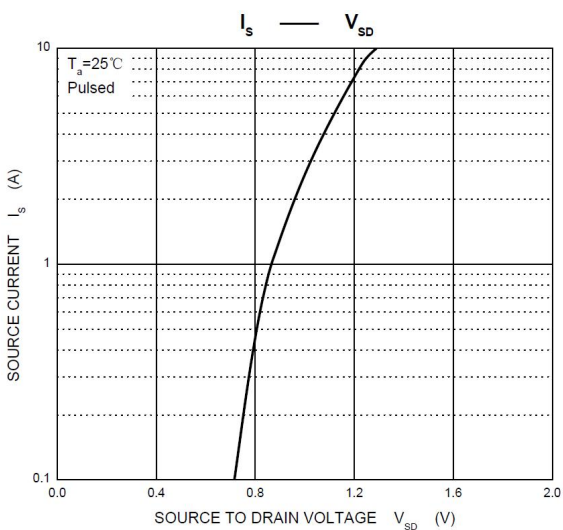
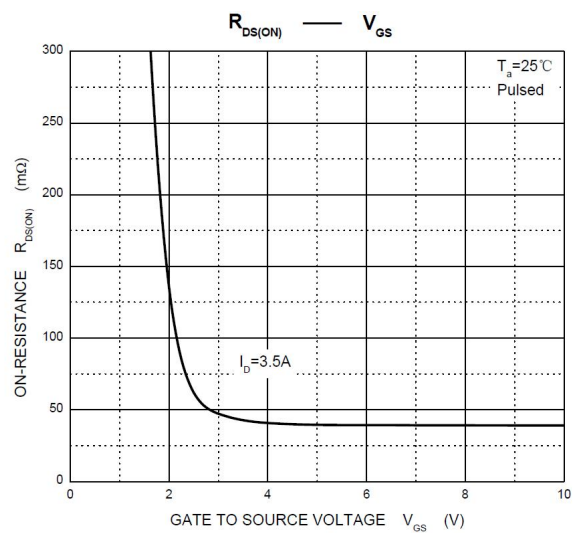
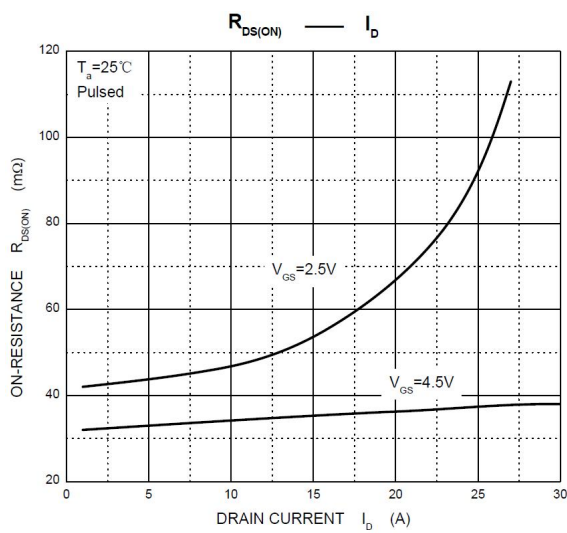
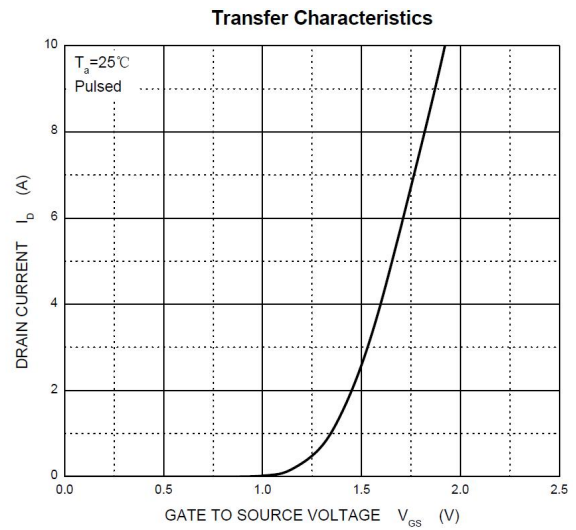
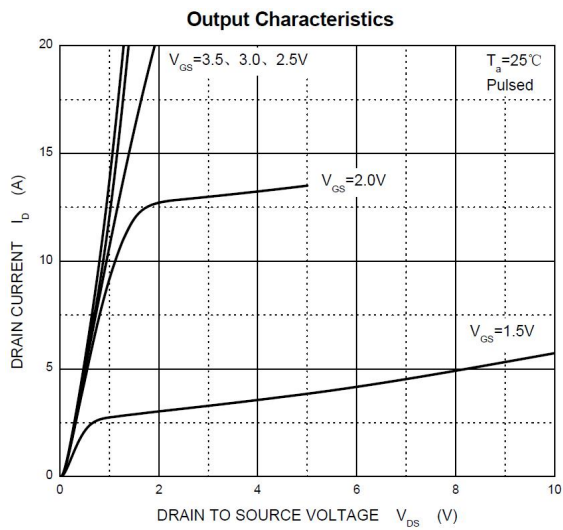
a: Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu s$, Duty Cycle=1%

Electrical Characteristics

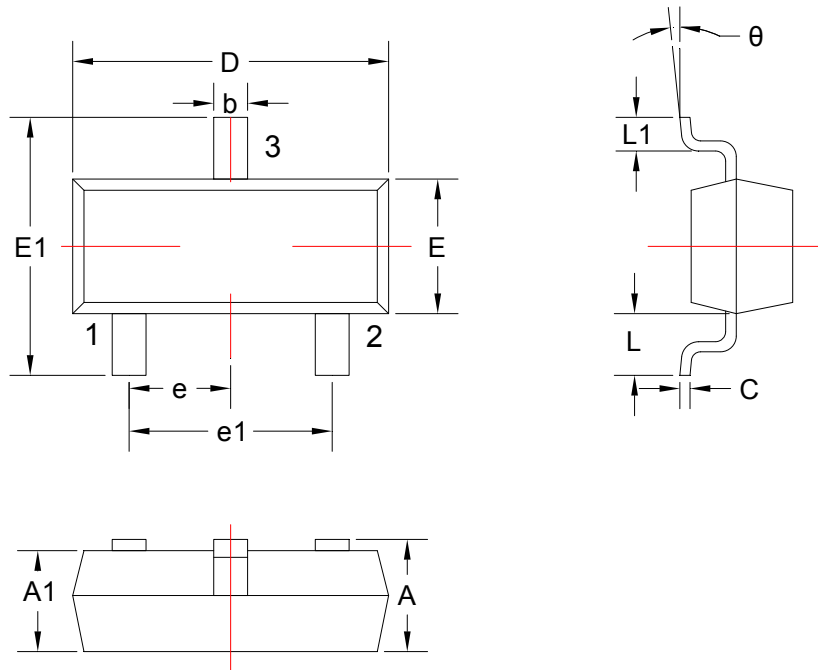
At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$			1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 10V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	0.45	0.7	1.1	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=3.5A$		36.0	55.0	m Ω
		$V_{GS}=2.5V, I_D=2.0A$		47.0	85.0	
Forward Trans conductance	g_{FS}	$V_{DS}=5.0V, I_D=3.5A$		7.8		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	$Q_{G(TOT)}$	$V_{GS}=4.5V, V_{DS}=10V, I_D=3.5A$		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	$t_{d(ON)}$	$V_{GS}=4.5V, V_{DS}=10V, R_L=55\Omega, R_G=6\Omega$		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



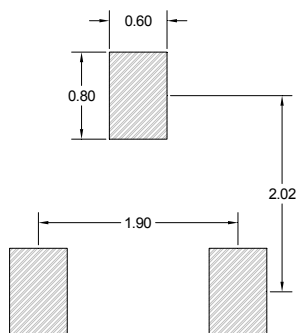
8. Dimension (SOT-23)



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	3.000	L1	0.300	0.500
E	1.200	1.400	theta	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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