

SuperMOS – SOT-23 -30V BV_{DSS} , 40m Ω $R_{DS(on)}$, -4.5A I_D P-channel MOSFET

1. Description

The NCE3401-ES is P-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 NCE3401-ES is Pb-free.

2. Features

- -30V, $R_{DS(ON)}=40m\Omega(Typ)$, $V_{GS}=-10V$
- $R_{DS(ON)}=54m\Omega(Typ)$, $V_{GS}=-4.5V$
- Fast Switching
- 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	Material	Quantity per reel	Flammability Rating
NCE3401-ES	SOT-23	Halogen free	3,000 PCS	UL 94V-0

Table-1 Ordering information

5. Pin Configuration and Functions


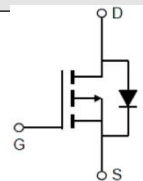
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

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}	-30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	$T_A=25^\circ\text{C}$	-4.5	A
	$T_A=100^\circ\text{C}$	-3.5	
Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.4	W
	$T_A=100^\circ\text{C}$	0.9	
Pulsed Drain Current	I_{DM}	-30	A
Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$

Thermal resistance ratings

Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance ^a	$R_{\theta JA}$	90	$^\circ\text{C/W}$
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	60	

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}	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-24V, V_{GS}=0V$			-1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.5	-0.8	-1.1	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-4.0A$		40	60	m Ω
		$V_{GS}=-4.5V, I_D=-3.0A$		54	78	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V$ $V_{DS}=-15V$ $f=1MHz$		954		pF
Output Capacitance	C_{OSS}			115		
Reverse Transfer Capacitance	C_{RSS}			77		
Gate Resistance	R_g	$f=1MHz$		6		Ω
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=-4.5V$ $V_{DS}=-15V$ $I_D=-4A$		9.4		nC
Gate-to-Source Charge	Q_{GS}			2		
Gate-to-Drain Charge	Q_{GD}			3		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=-10V$ $V_{DS}=-15V$ $R_L=3.6\Omega$ $R_G=6\Omega$		6.3		ns
Rise Time	t_r			3.2		
Turn-Off Delay Time	$t_{d(OFF)}$			38.2		
Fall Time	t_f			12		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-1.0A$		-0.8	-1	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_{SD}=-4A,$ $dI/dt=100A/\mu s$		32		ns
Reverse Recovery Charge	Q_{rr}			11		nC

7. Typical Characteristic

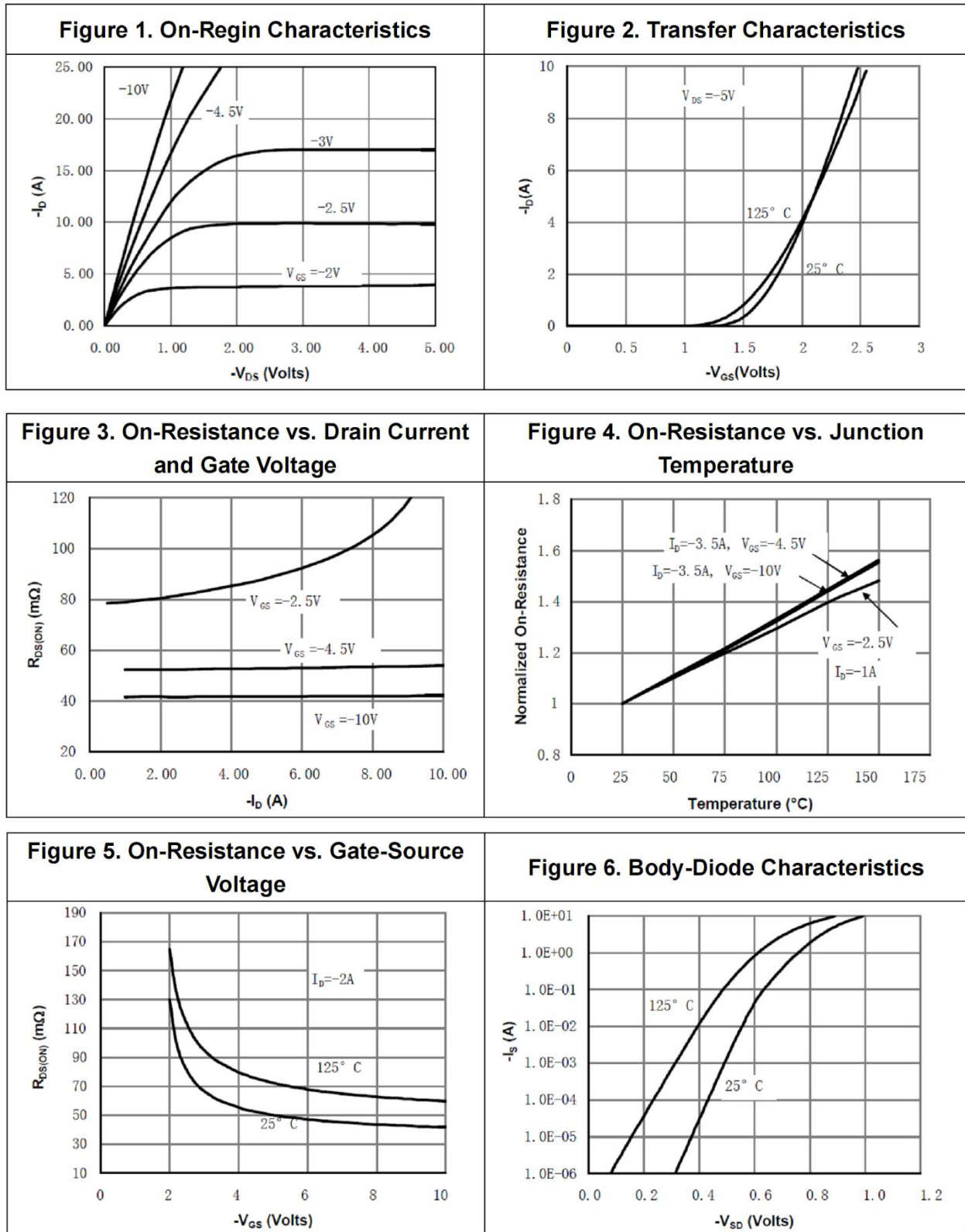


Figure 7. Gate-Charge Characteristics

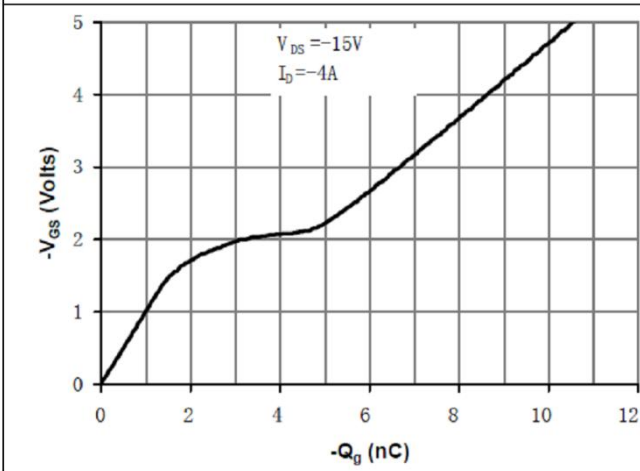


Figure 8. Capacitance Characteristics

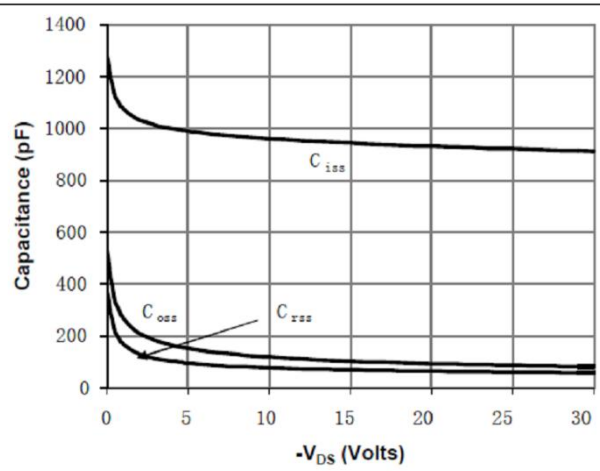


Figure 9. Maximum Forward Biased Safe Operating Area

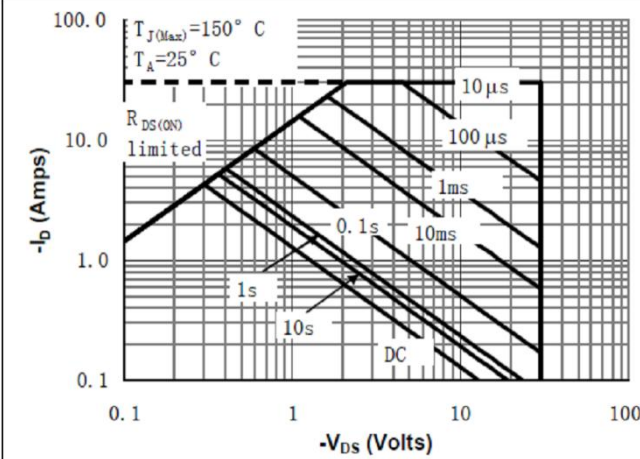


Figure 10. Single Pulse Power Rating Junction-to-Ambient

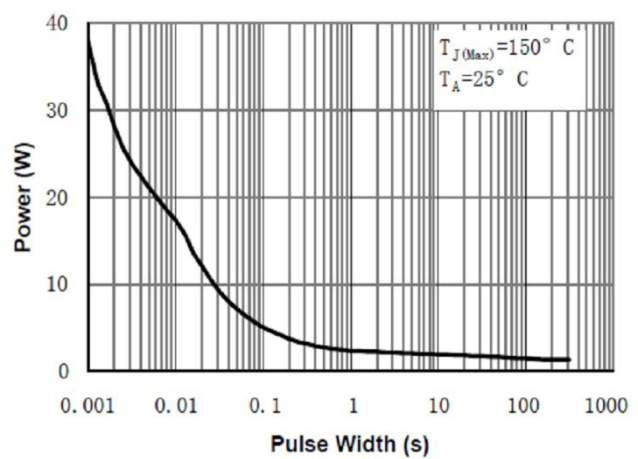
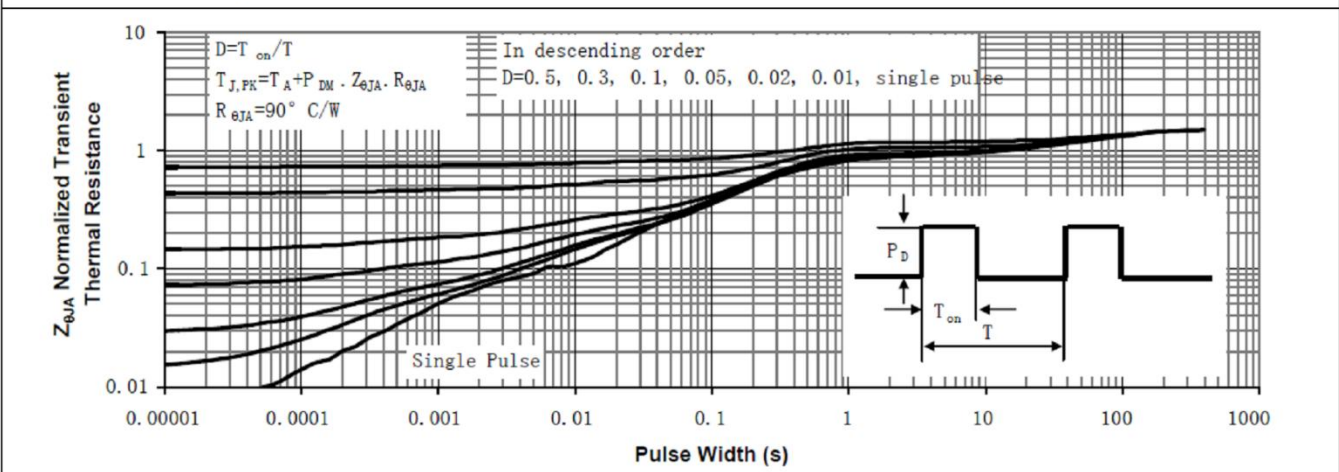
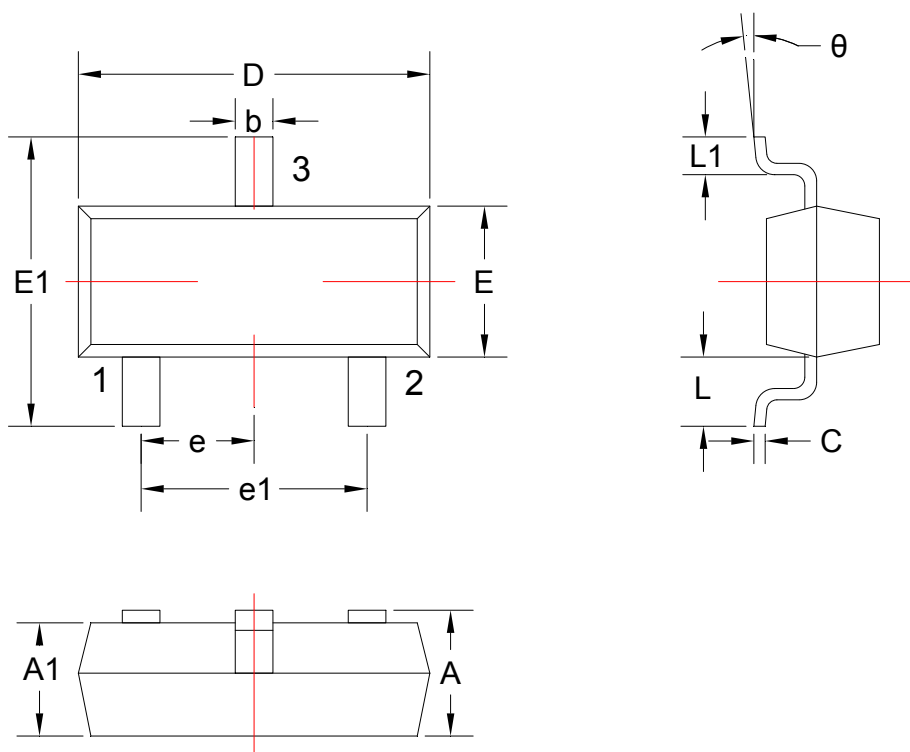


Figure 11. Normalized Maximum Transient Thermal Impedance



8. Dimension (SOT-23)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

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°

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