

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

**1. Description**

The NCE3401AY-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 NCE3401AY-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
NCE3401AY-ES	SOT-23	Halogen free	3,000 PCS	UL 94V-0

Table-1 Ordering information

**5. Pin Configuration and Functions**


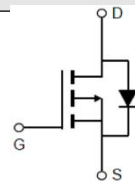
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

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	$V_{GS}$	$\pm 12$	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	°C
Storage Temperature Range	$T_{stg}$	-55 to +150	°C

### Thermal resistance ratings

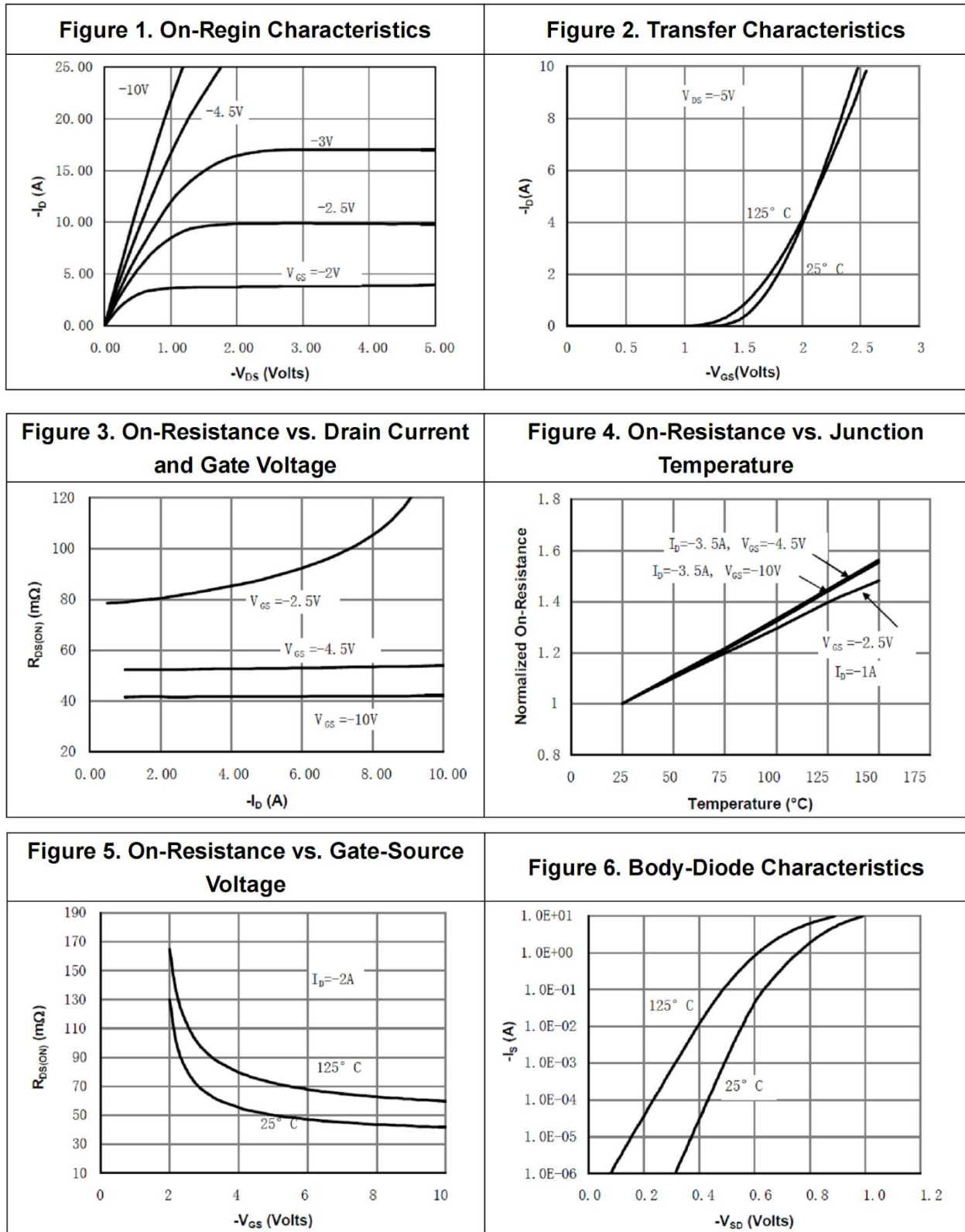
Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$R_{\theta JA}$	90	°C/W
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	60	

## Electrical Characteristics

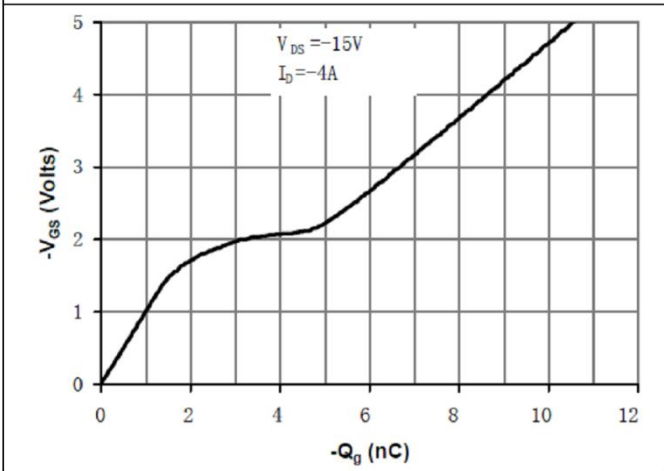
At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
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	$\mu A$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 12V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
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 $\Omega$
		$V_{GS}=-4.5V, I_D=-3.0A$		54	78	
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
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		$\Omega$
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		
<b>SWITCHING CHARACTERISTICS</b>						
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		
<b>BODY DIODE CHARACTERISTICS</b>						
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

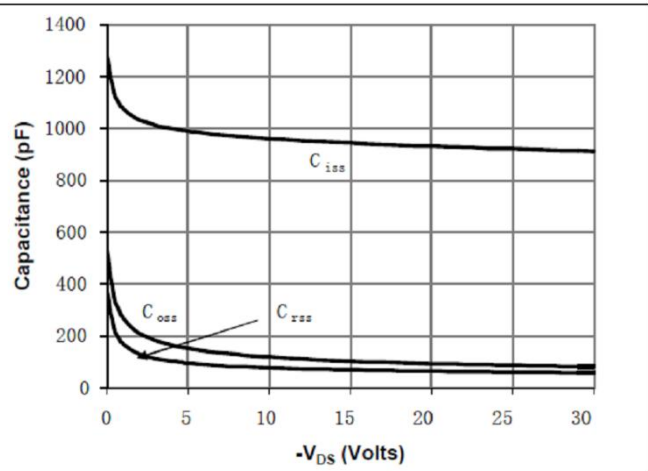
7. Typical Characteristic



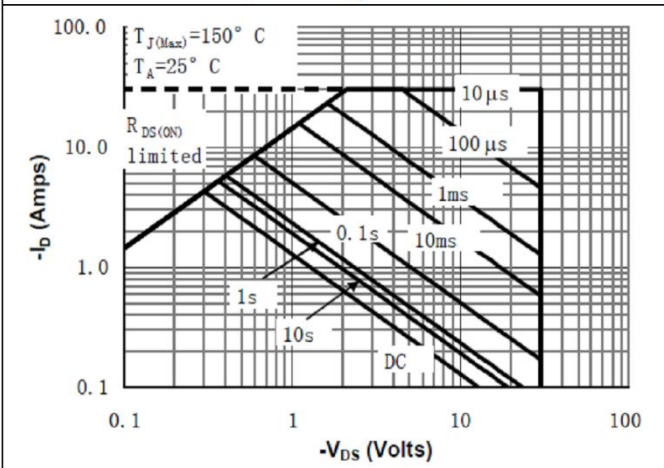
**Figure 7. Gate-Charge Characteristics**



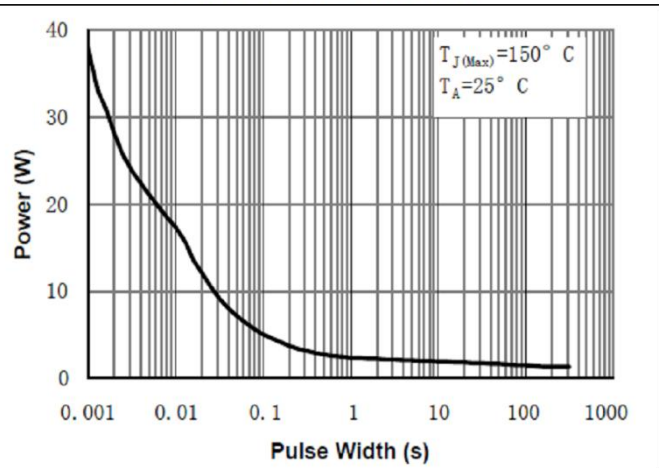
**Figure 8. Capacitance Characteristics**



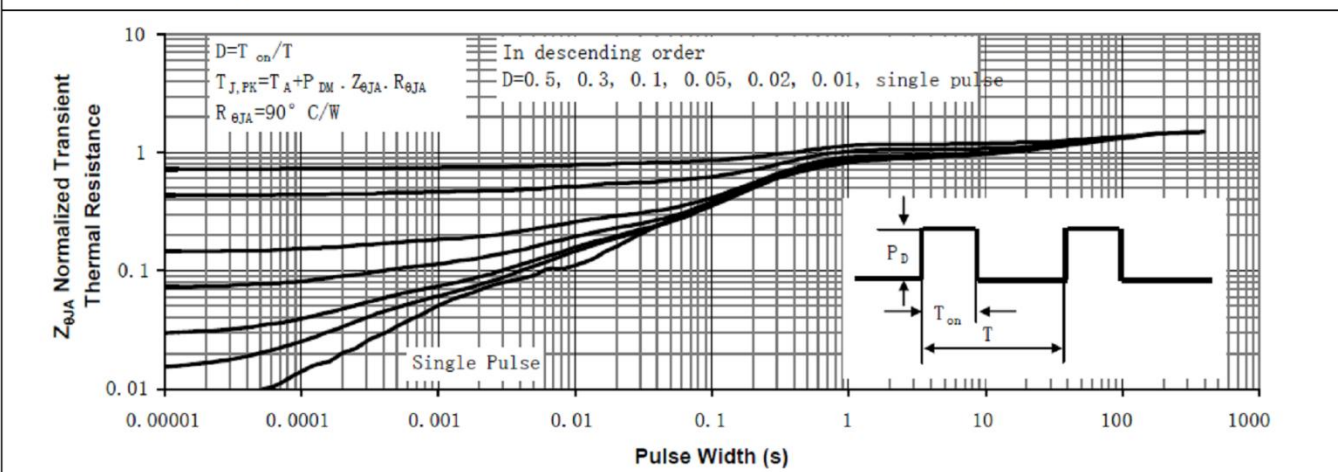
**Figure 9. Maximum Forward Biased Safe Operating Area**



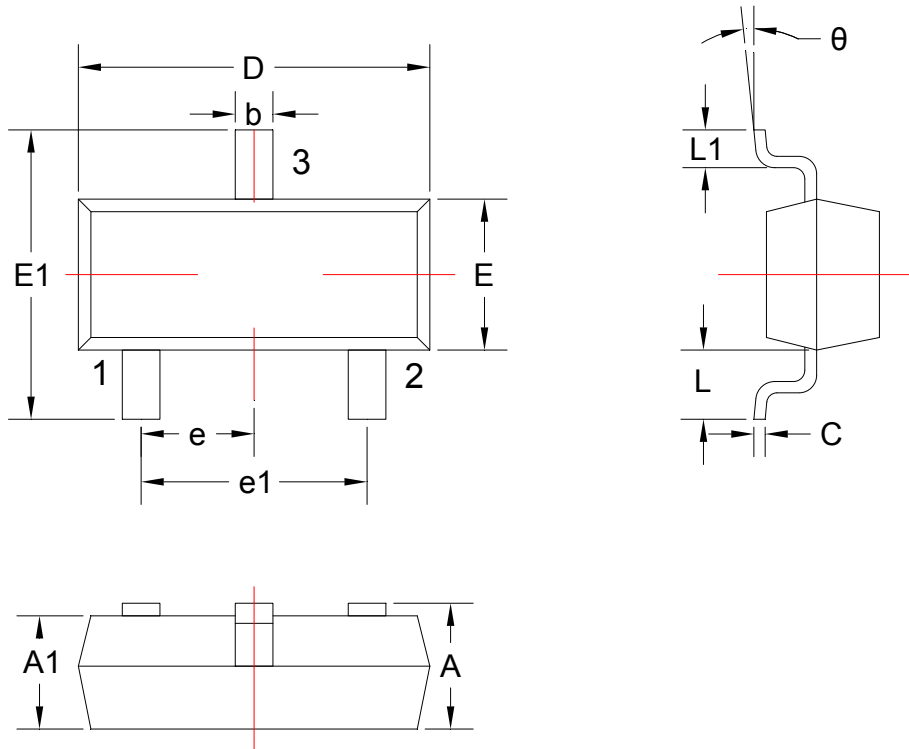
**Figure 10. Single Pulse Power Rating Junction-to-Ambient**



**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	$\theta$	0°	8°

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