SuperMOS – SOT-23 30V BV_{DSS},19mΩ $R_{DS(ON)}$,6.0A I_D N-channel MOSFET

1. Description

The NCE3400-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 NCE3400-ES is Pb-free.

2. Features

- 30V, $R_{DS(ON)}$=19mΩ(Typ), V_{GS}=10V
  $R_{DS(ON)}$=25mΩ(Typ), V_{GS}=4.5V
- 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
NCE3400-ES	SOT-23	R0	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

Table-1 Ordering information

5. Pin Configuration and Functions

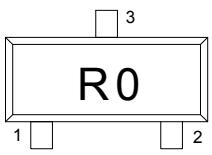
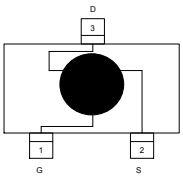
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 ℃ 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 [a]	T_A=25°C	I_D	6.0	A
	T_A=70°C		4.6	
Maximum Power Dissipation [a]	T_A=25°C	P_D	1.4	W
	T_A=70°C		0.9	
Pulsed Drain Current [c]		I_{DM}	30	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 [a]	t ≤ 10 s	$R_{\theta JA}$	75	90	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	43	70	

Note:

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR4 board using minimum pad size, 1oz copper

c Repetitive rating, pulse width limited by junction temperature, tp=10μs, Duty Cycle=1%

Electrical Characteristics

At TA = 25℃ 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	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	uA
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	0.6	1.0	1.3	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=6.0A		19.0	28.0	mΩ
		V_{GS}=4.5V, I_D=5.0A		25.0	33.0	
		V_{GS}=2.5V, I_D=3.0A		33.0	51.0	
Forward Trans conductance	g_{FS}	V_{DS}=5.0V, I_D=5.8A		7.8	15	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS}=0V, f=1MHz, V_{DS} =10V		550		pF
Output Capacitance	C_{OSS}			62		
Reverse Transfer Capacitance	C_{RSS}			48		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=4.5V, V_{DS}=10V, I_D =5.8A		6.7		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.75		
Gate-to-Source Charge	Q_{GS}			1.65		
Gate-to-Drain Charge	Q_{GD}			1.78		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	V_{GS}=4.5V, V_{DS}=10V, R_L=10Ω, R_G=6Ω		3.8		ns
Rise Time	t_r			13.0		
Turn-Off Delay Time	$t_{d(OFF)}$			14.2		
Fall Time	t_f			2.0		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1.0A		0.75	1.5	V

7. Typical Characteristic

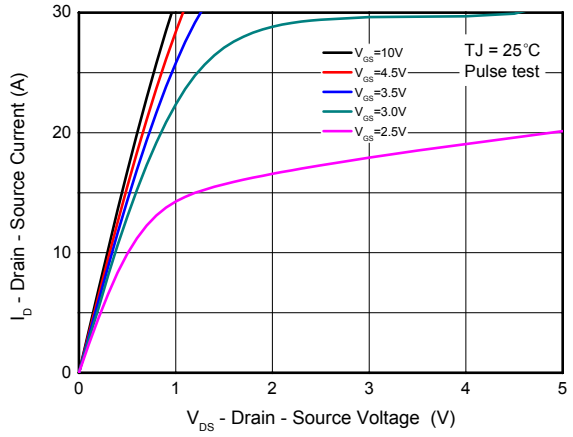


Figure 1. Typ. Output

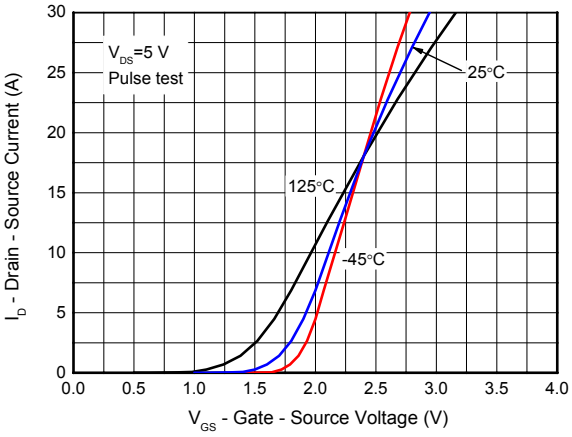


Figure 2. Transfer Characteristics

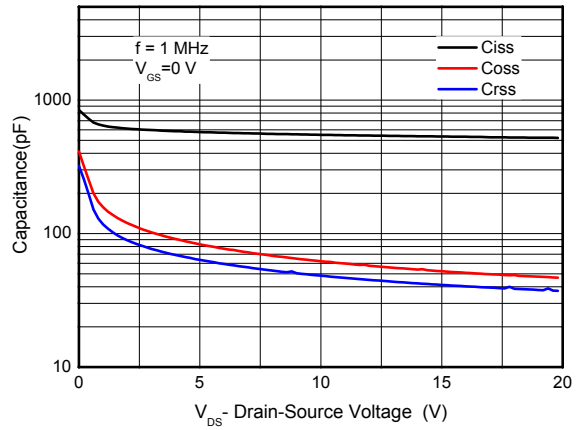


Figure 3. Capacitance Characteristics

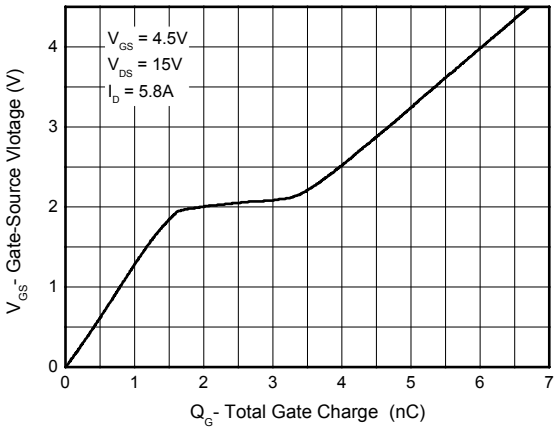


Figure 4. Gate Charge Waveform

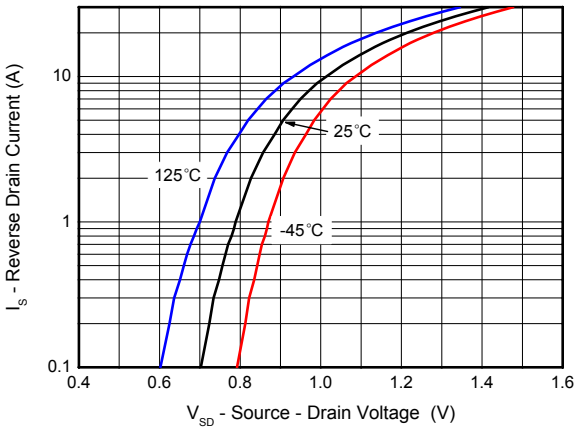


Figure 5. Body-Diode Characteristics

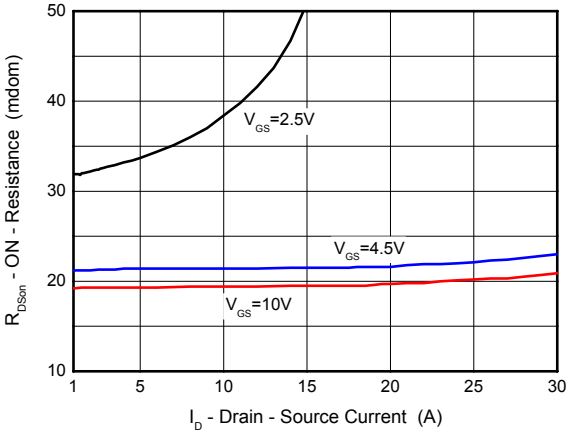


Figure 6. Rdson-Drain Current

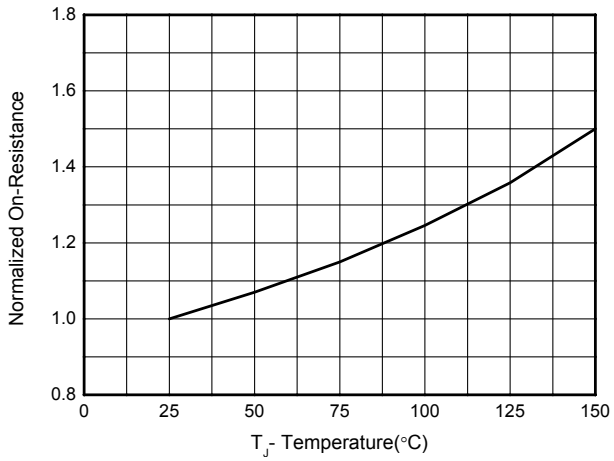


Figure 7. Rdson-Junction Temperature(℃)

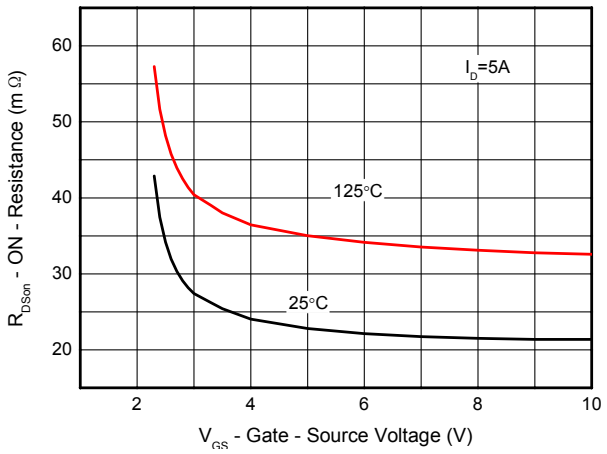


Figure 8: On-Resistance vs. Gate-Source

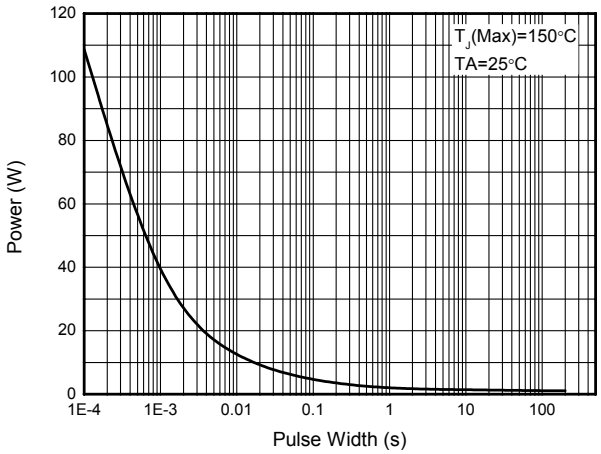


Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note E)

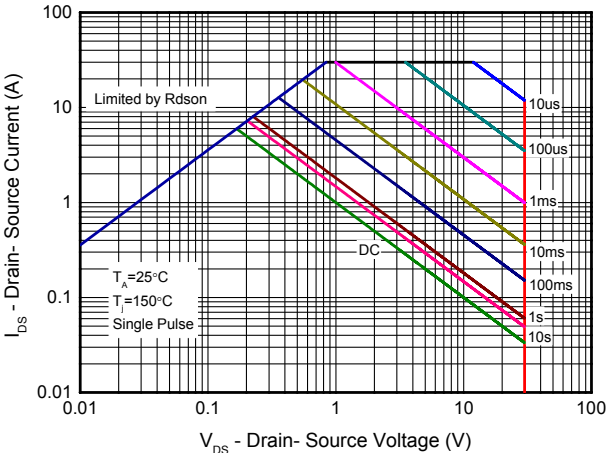
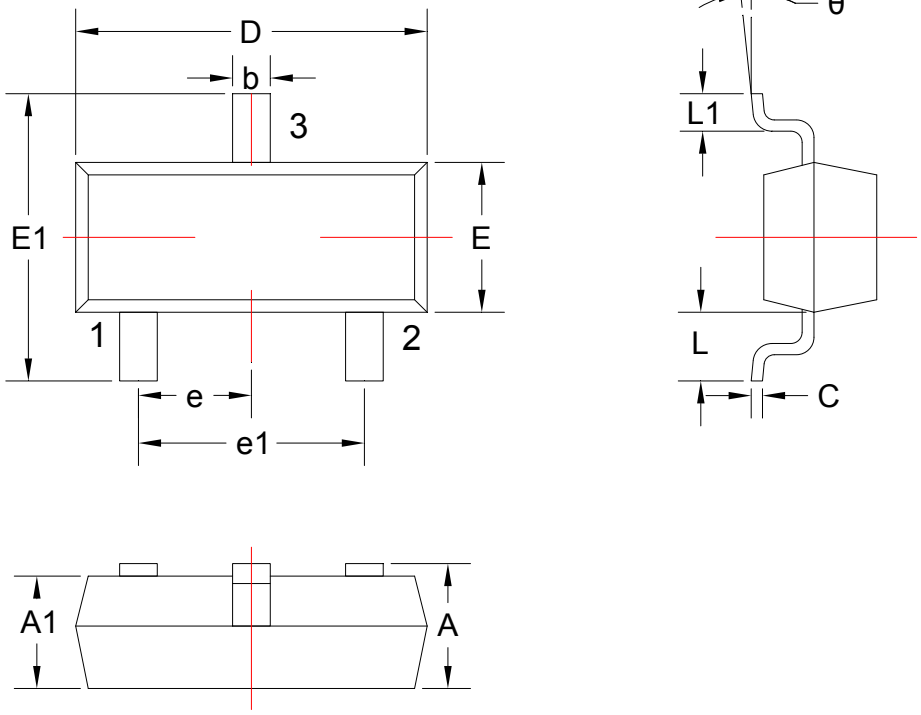
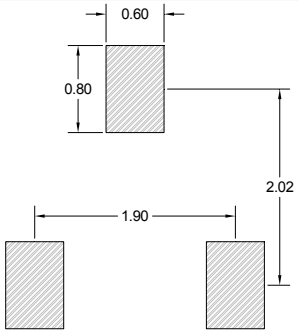


Figure 10. Maximum Safe Operation Area

8. Dimension and Patterns (SOT-23)



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°



Note:
1. Controlling dimension: in millimeters
2. General tolerance: ±0.05mm
3. The pad layout is for reference only
4. Unit: mm

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