

**SuperMOS – SOT-89 100V  $BV_{DSS}$ , 95m $\Omega$   $R_{DS(ON)}$ , N-channel MOSFET**

**1. Description**

The NCE0103M-ES is N-Channel enhancement MOS Field Effect Transistor. Using advanced shielded gate 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 NCE0103M-ES is Pb-free.

**2. Features**

- 100V,  $R_{DS(ON)}=95m\Omega(TYP.) @V_{GS}=10V$
- $R_{DS(ON)}=125m\Omega(TYP.) @V_{GS}=4.5V$
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

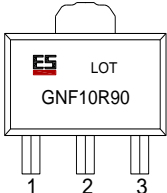
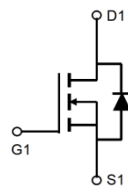
**3. Applications**

- PWM applications
  - Load switch
  - Power management in portable/desktop PCs
  - DC/DC conversion
- 100% UIS TESTED**

**4. Ordering Information**

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
NCE0103M-ES	SOT-89	GNF10R90/LOT	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

**5. Pin Configuration and Functions**

Pin	Function	Outline	Circuit Diagram
1	Gate		
3	Source		
2	Drain		

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$BV_{DSS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	5
		$T_A=75^\circ\text{C}$	3.9
Maximum Power Dissipation	$P_D$	5.2	W
Pulsed Drain Current	$I_{DM}$	20	A
Avalanche Current, Single Pulsed <sup>a</sup>	$I_{AS}$	4	A
Avalanche Energy, Single Pulsed <sup>a</sup>	$E_{AS}$	4	mJ
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	$R_{\theta JA}$		18	°C/W

Note:

a:  $T_J=25^\circ\text{C}$ ,  $V_{DD}=50\text{V}$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$

## 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	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$			1	$\mu A$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.65	2.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.5A$		95	135	m $\Omega$
		$V_{GS}=4.5V, I_D=2A$		125	195	
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, f=1MHz, V_{DS}=25V$		206		pF
Output Capacitance	$C_{OSS}$			29		
Reverse Transfer Capacitance	$C_{RSS}$			1.4		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=25V, I_D=2.5A$		4.2		nC
Gate-to-Source Charge	$Q_{GS}$			1.5		
Gate-to-Drain Charge	$Q_{GD}$			1.1		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}25V, I_D=2.5A, R_G=2\Omega$		14.7		ns
Rise Time	$t_r$			3.5		
Turn-Off Delay Time	$t_{d(OFF)}$			20.9		
Fall Time	$t_f$			2.7		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.0A$		0.8	1.5	V

### 7. Typical Characteristic

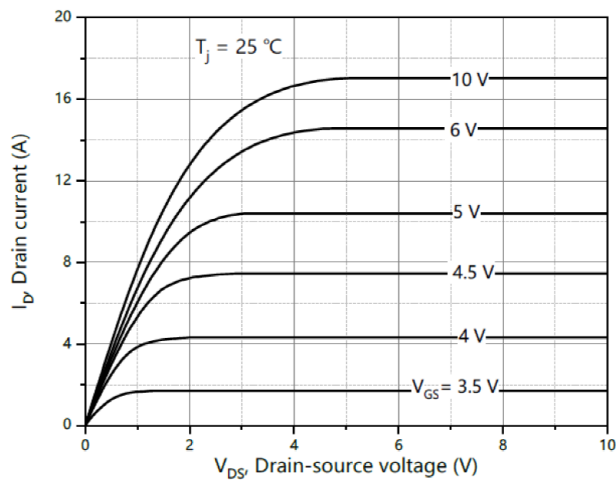


Figure1. Output Characteristics

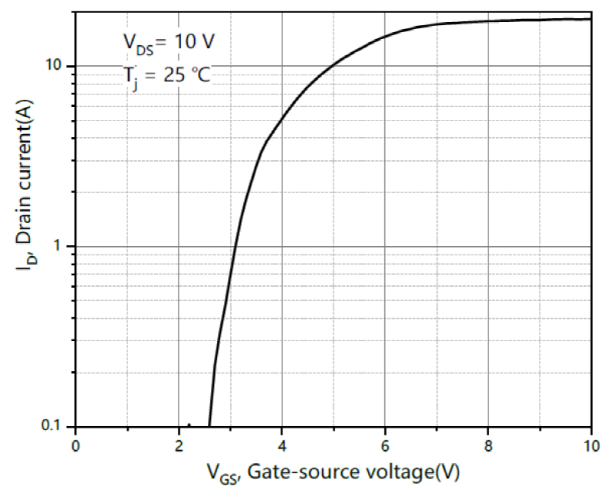


Figure2. Transfer Characteristics

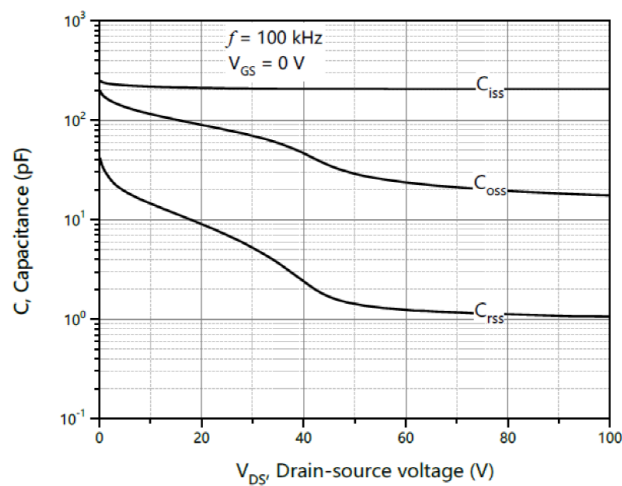


Figure3. Capacitance Characteristics

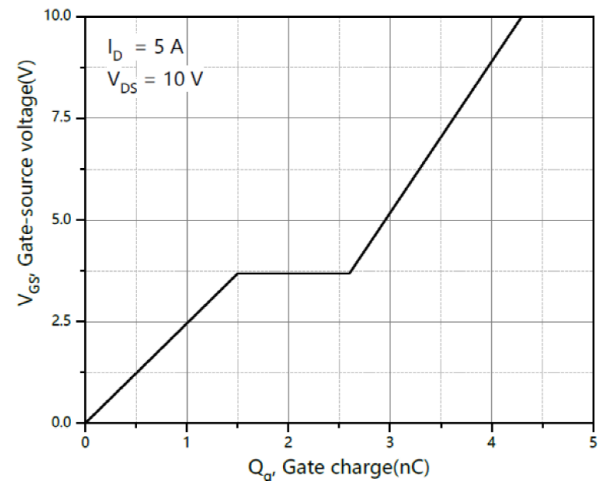


Figure4. Gate Charge

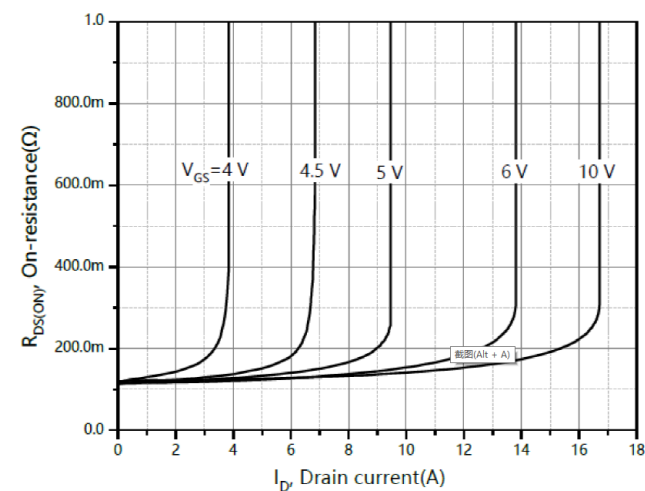


Figure5. : On-Resistance vs. Drain Current and Gate Voltage

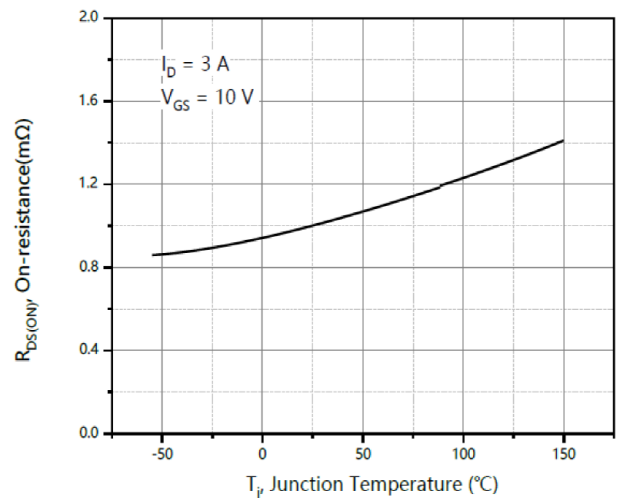
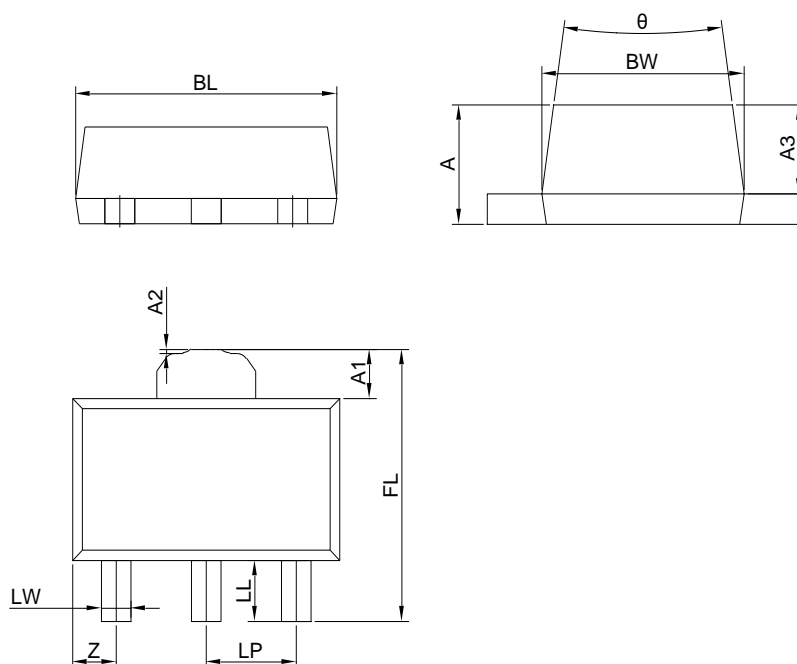
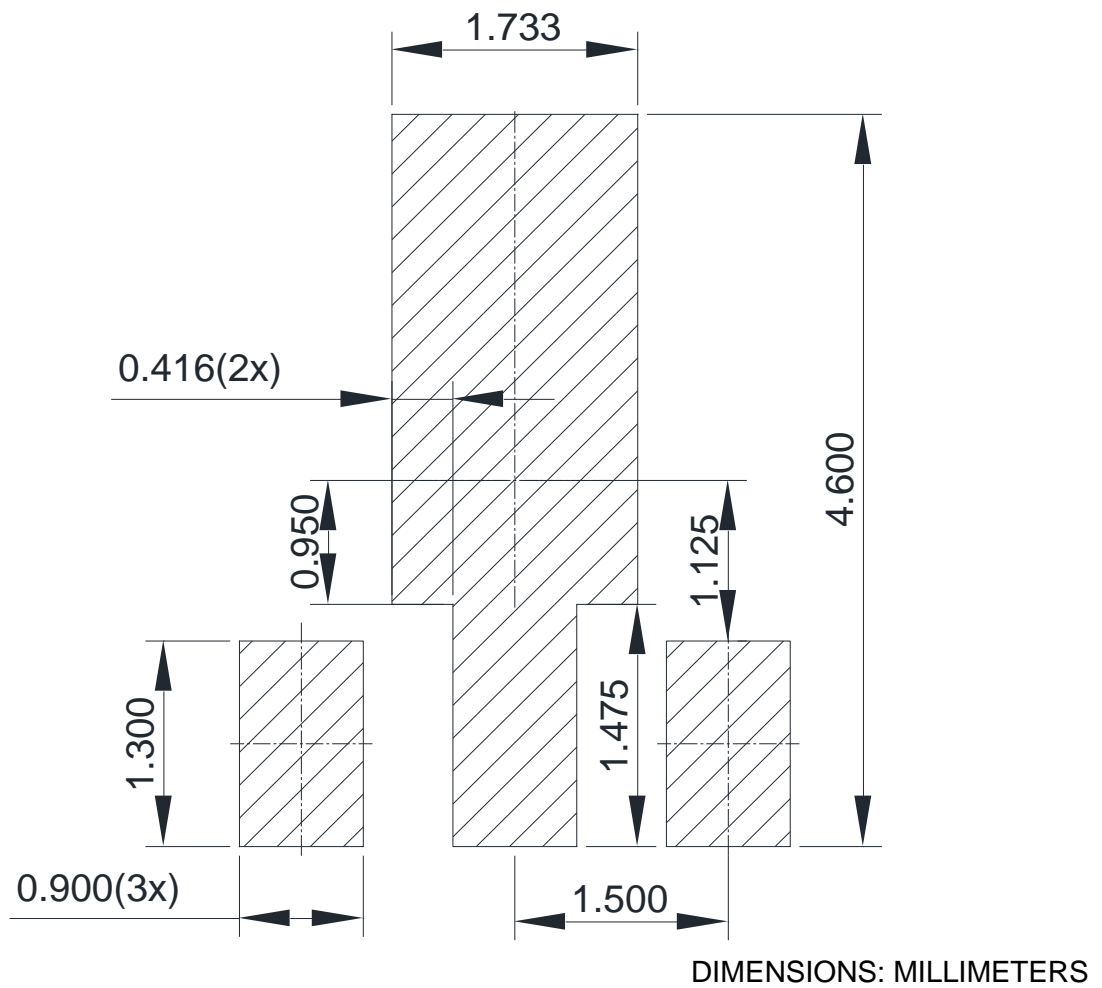


Figure6. Normalized On-Resistance

8. Dimension (SOT-89)



SYMBOL	Millimeters		SYMBOL	Millimeters	
	Max	Min		Max	Min
BL	4.55	4.45	A1	0.75	0.65
BW	2.55	2.35	A2	0.05.BSC	
FL	4.3	4.1	A3	1.12.BSC	
LP	1.55	1.45	LL	1.00	0.90
LW	0.49	0.47	theta	16° REF	
A	1.50 REF		z	0.75 REF	

**9. Recommended Soldering Footprint**

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