

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

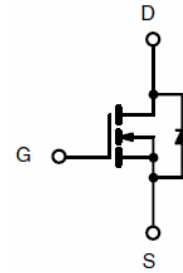
The NCE0106AR uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS} = 100V, I_D = 6A$   
 $R_{DS(ON)} < 130m\Omega @ V_{GS}=10V$  (Typ:108m $\Omega$ )  
 $R_{DS(ON)} < 140m\Omega @ V_{GS}=4.5V$  (Typ:115m $\Omega$ )
- High density cell design for ultra low  $R_{Dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- [Pb free terminal plating](#)
- [RoHS compliant](#)
- [Halogen free](#)

### Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



SOT-223 top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE0106AR	NCE0106AR	SOT-223-3L	Ø330mm	12mm	2500 units

### Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	6	A
Drain Current-Continuous( $T_C=100^\circ C$ )	$I_D(100^\circ C)$	4.2	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	24	A
Maximum Power Dissipation	$P_D$	3	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	60	$^\circ C/W$
Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> (Drain)	$R_{\theta JC}$	41.7	$^\circ C/W$

### Electrical Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	110	-	V

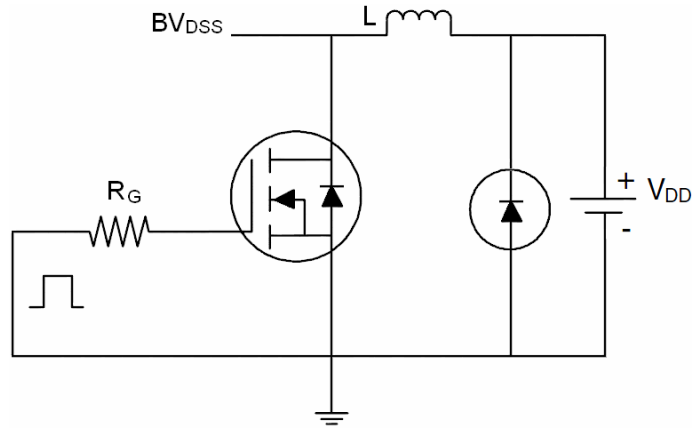
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.1	1.5	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	-	108	130	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	115	140	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=5A$	-	8	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0MHz$	-	892	-	PF
Output Capacitance	$C_{oss}$		-	27	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	23	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=50V, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	11	-	nS
Turn-on Rise Time	$t_r$		-	7.4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	nS
Turn-Off Fall Time	$t_f$		-	9.1	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=50V, I_D=5A,$ $V_{GS}=10V$	-	25.2	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.6	-	nC
Gate-Drain Charge	$Q_{gd}$		-	5.1	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=6A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	6	A

### Notes:

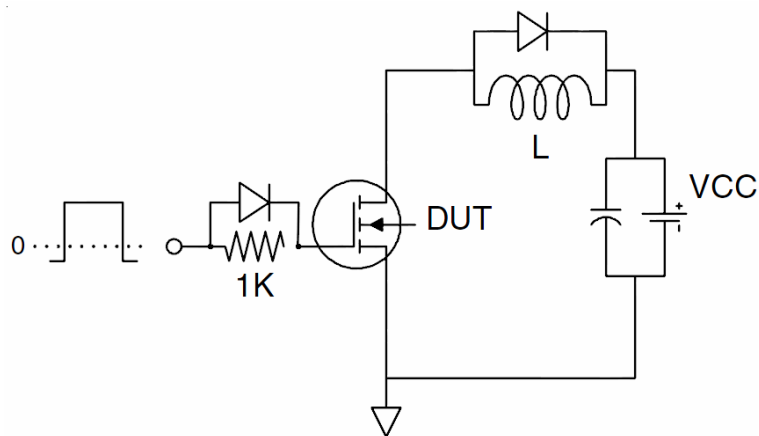
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to product

**Test Circuit**

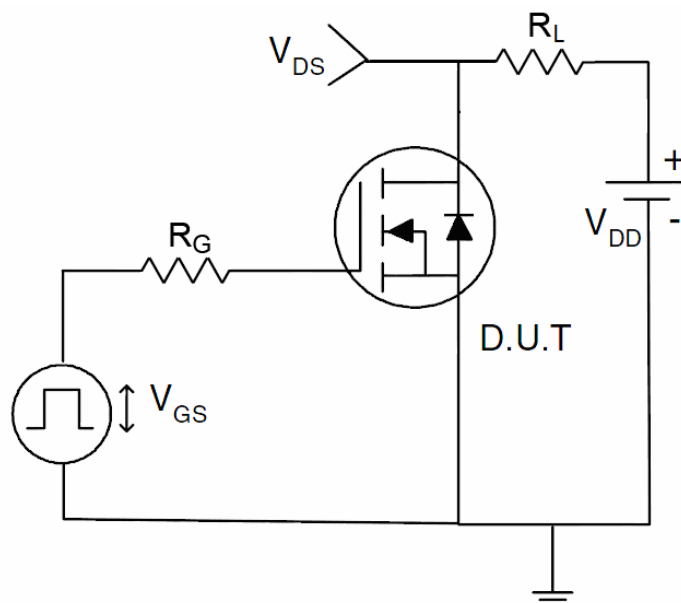
1)  $E_{AS}$  test circuit



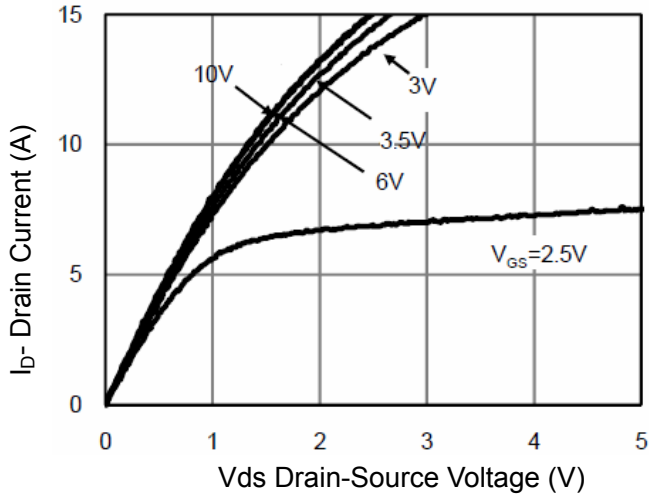
2) Gate charge test circuit



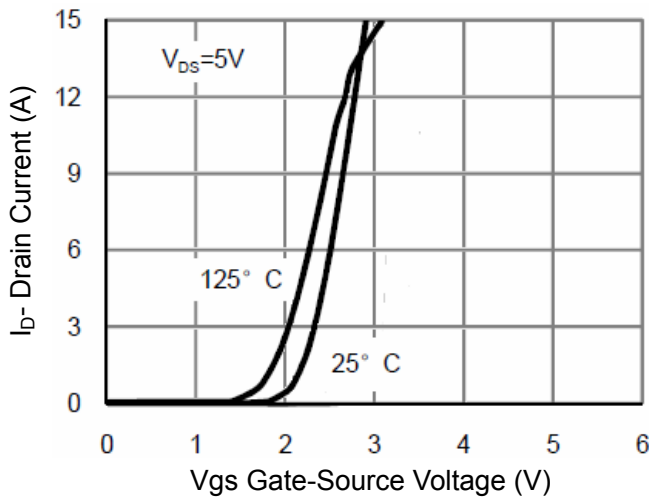
3) Switch Time Test Circuit



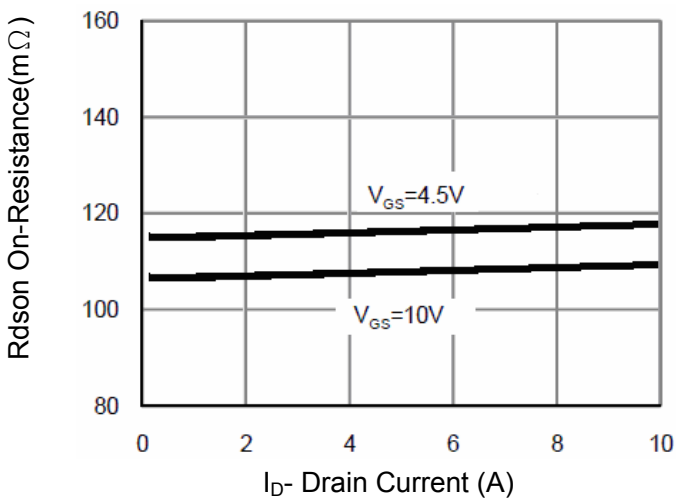
**Typical Electrical and Thermal Characteristics (Curves)**



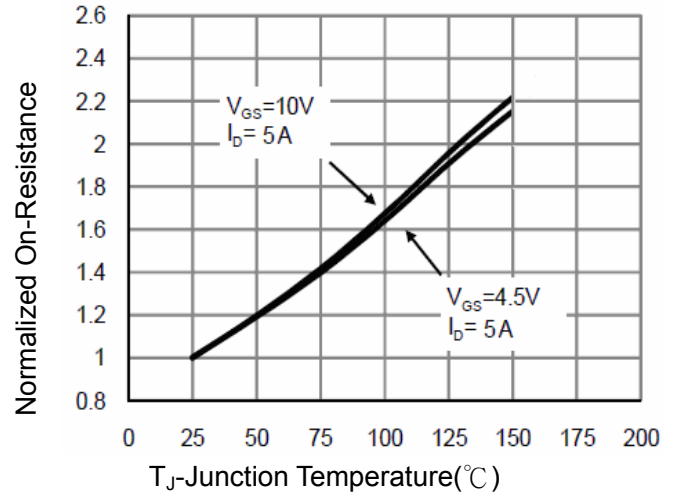
**Figure 1 Output Characteristics**



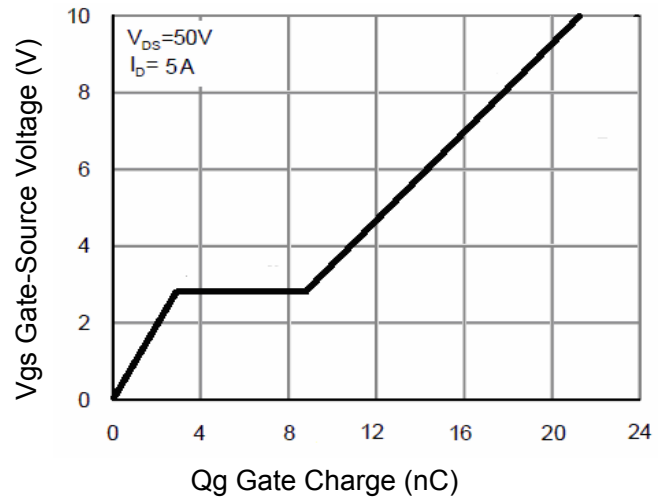
**Figure 2 Transfer Characteristics**



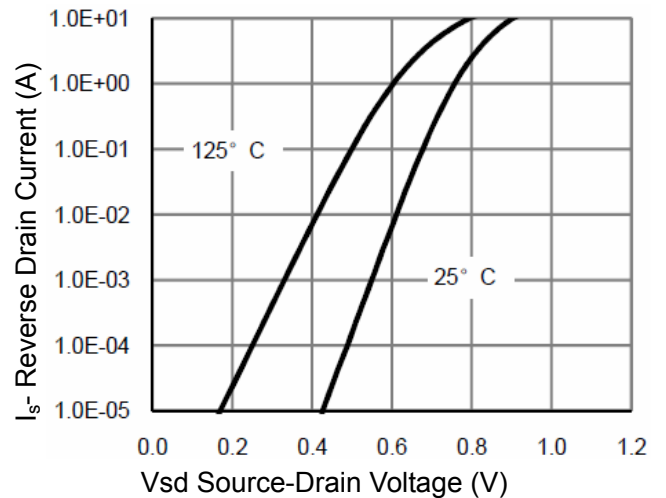
**Figure 3 Rdson- Drain Current**



**Figure 4 Rdson-Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

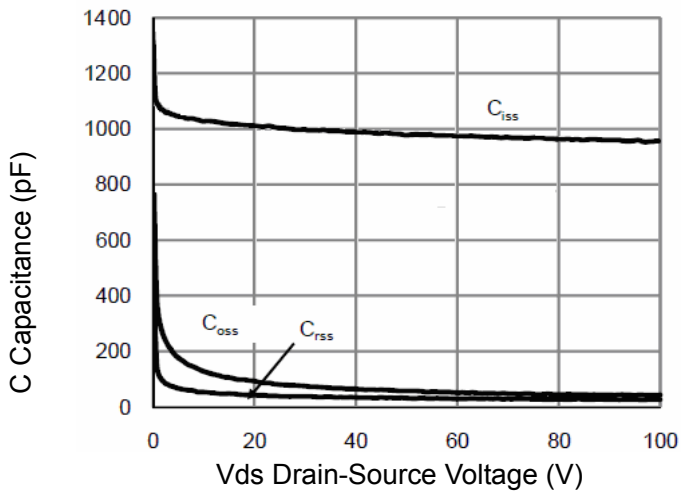


Figure 7 Capacitance vs Vds

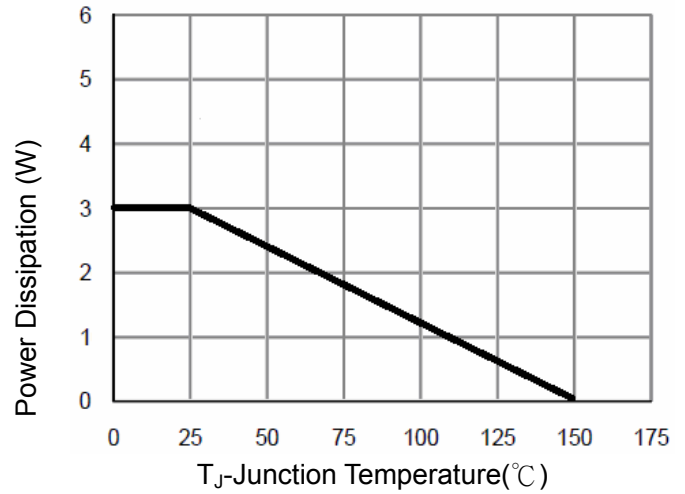


Figure 9 Power De-rating

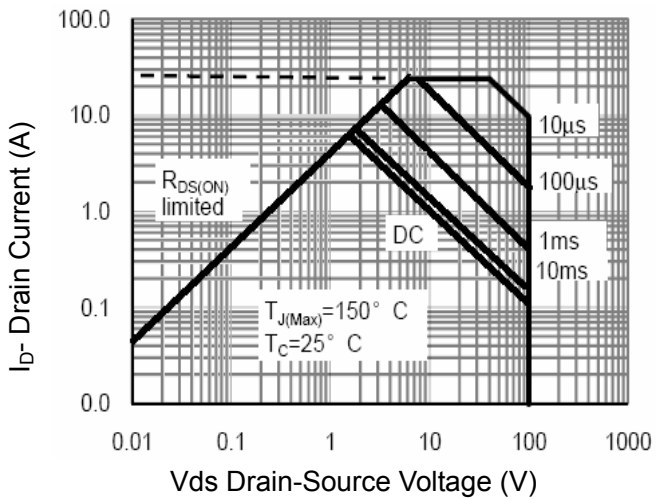


Figure 8 Safe Operation Area

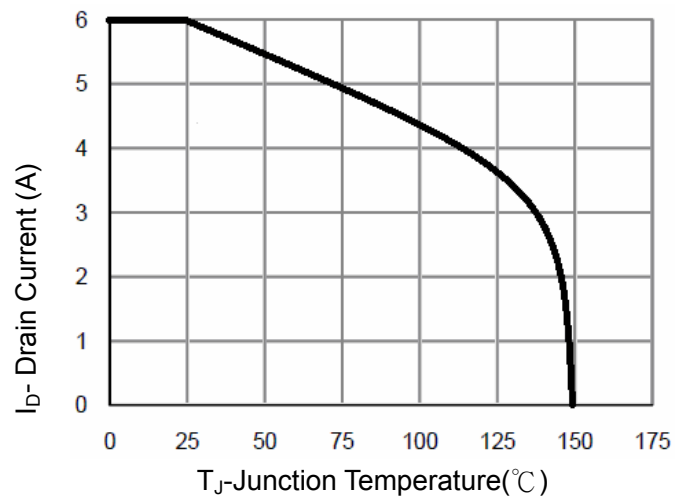


Figure 10 Current De-rating

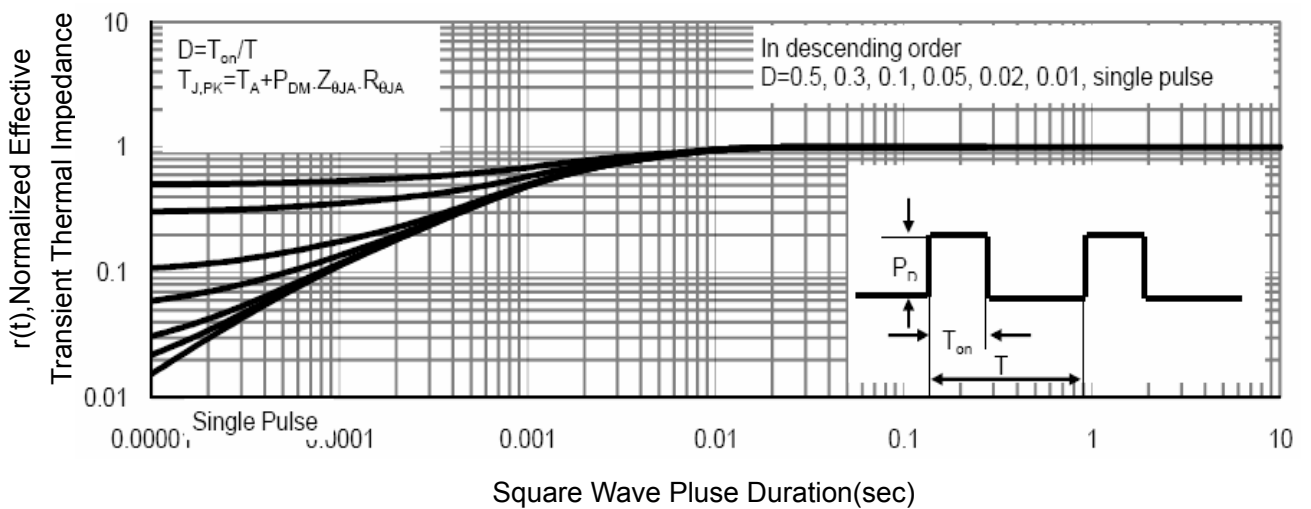
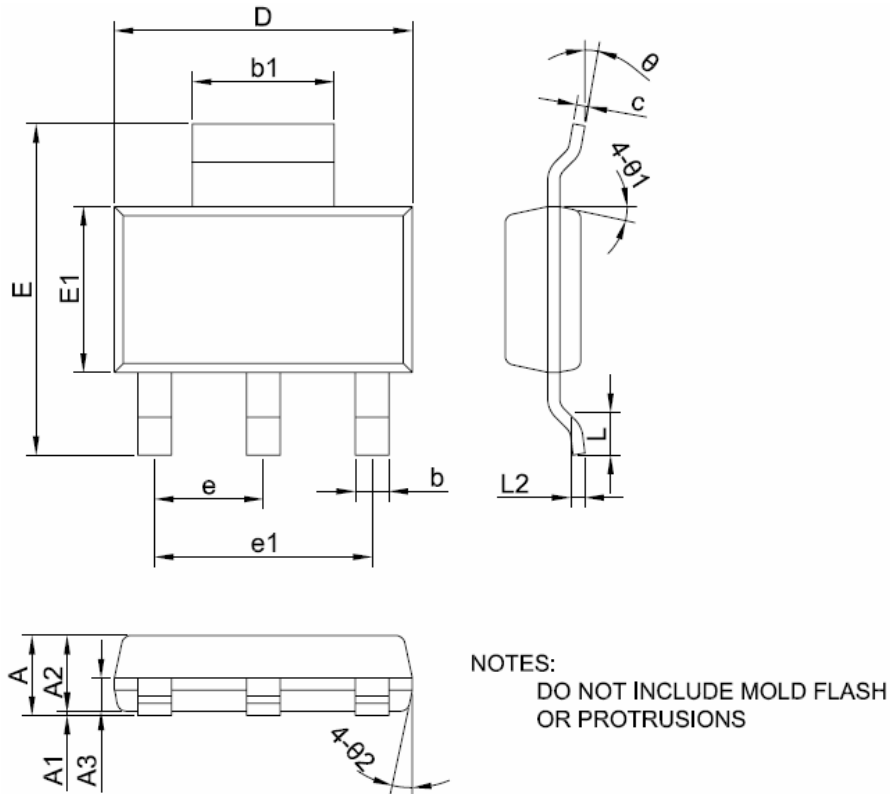


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-223 Package Information



SYMBOL	MIN	NOM	MAX
A	1.55	—	1.80
A1	0.02	—	0.12
A2	1.45	1.60	1.75
A3	0.60	0.70	0.80
b	0.60	—	0.80
b1	2.90	—	3.10
c	0.24	—	0.32
D	6.20	6.30	6.50
E	6.70	7.00	7.30
E1	3.30	3.50	3.70
e	2.299REF		
e1	4.598REF		
L	0.90MIN		
L2	0.30BSC		
$\theta$	0°	—	10°
$\theta_1$	10°	12°	14°
$\theta_2$	10°	12°	14°

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