

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

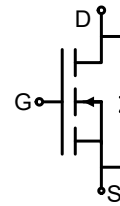
The NCE0102 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

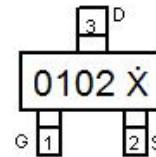
- $V_{DS} = 100V, I_D = 2A$   
 $R_{DS(ON)} < 230m\Omega @ V_{GS}=10V$  (Typ:190m $\Omega$ )  
 $R_{DS(ON)} < 250m\Omega @ V_{GS}=4.5V$  (Typ:200m $\Omega$ )
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

### Application

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



Schematic diagram



Marking and pin assignment



SOT-23 top view

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
0102 X	NCE0102	SOT-23	Ø180mm	8 mm	3000 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	$I_D$	2	A
Drain Current-Continuous( $T_C=100^\circ C$ )	$I_D(100^\circ C)$	1.4	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	8	A
Maximum Power Dissipation	$P_D$	1.25	W
Avalanche Current (Note 1)	$I_{AR}$	2	A
Single pulse avalanche energy (Note 5)	$E_{AS}$	2.45	mJ
Reverse diode $dv/dt$ , $V_{DS} \leq 80V$ , $I_{SD} < I_D$	$dv/dt$	15	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

## Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	100	$^\circ C/W$
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**Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

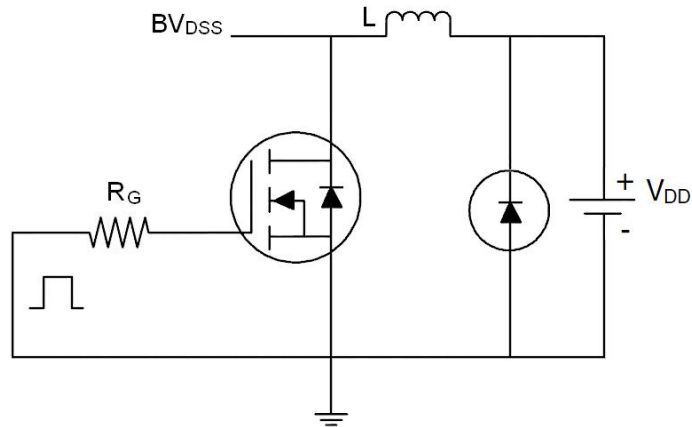
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100	110	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.8	2.5	V
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	190	230	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A	-	200	250	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =2A	1	-	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, F=1.0MHz	-	360.6	-	PF
Output Capacitance	C <sub>oss</sub>		-	24.6	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	13	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =50V, R <sub>L</sub> =25Ω V <sub>GS</sub> =10V, R <sub>G</sub> =1Ω	-	6	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	10	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	12	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	8	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =2A, V <sub>GS</sub> =10V	-	12.0	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.8	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	2.9	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =2A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	2	A

**Notes:**

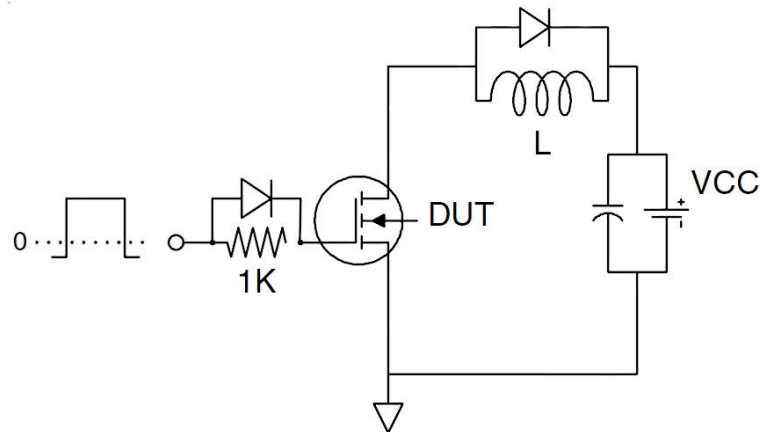
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T<sub>j</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω

### Test Circuit

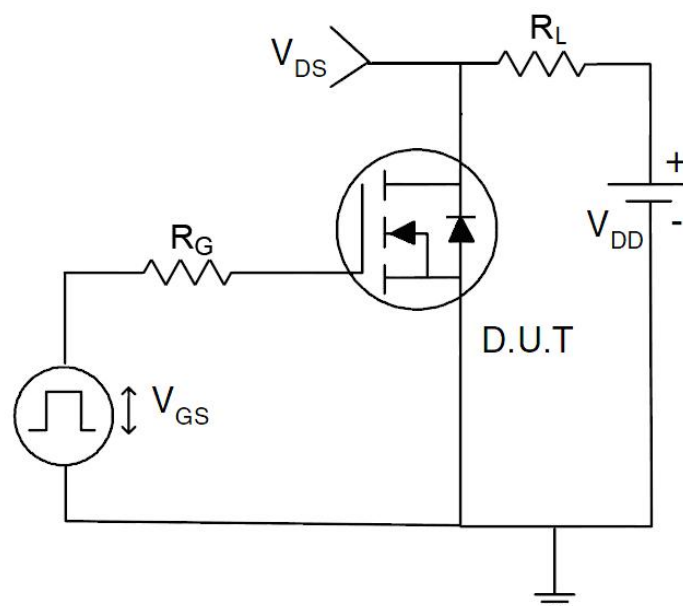
#### 1) EAS test circuit



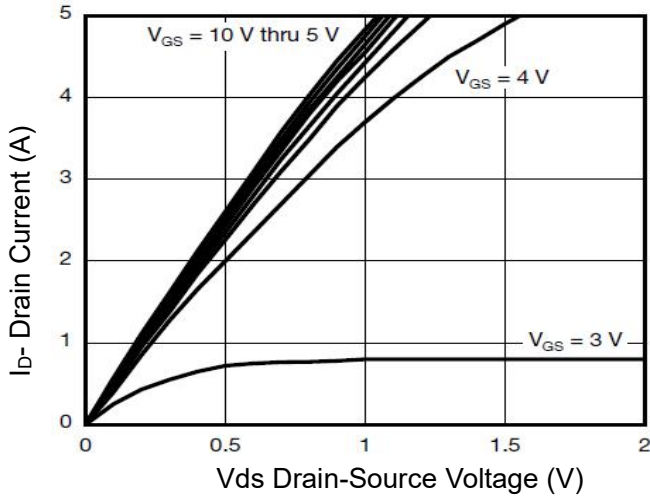
#### 2) Gate charge test circuit



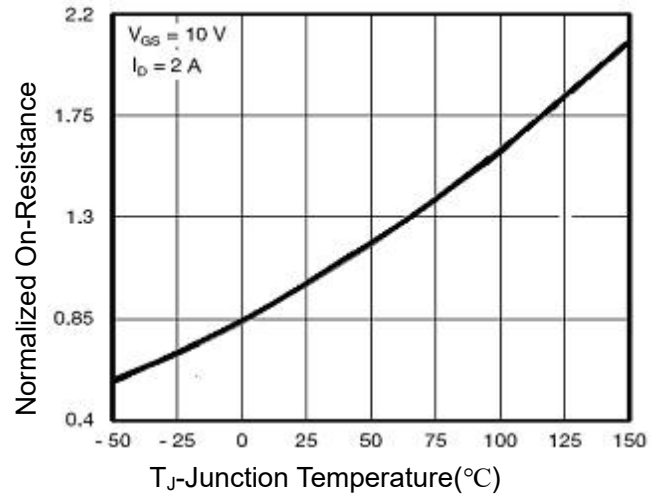
#### 3) Switch Time Test Circuit



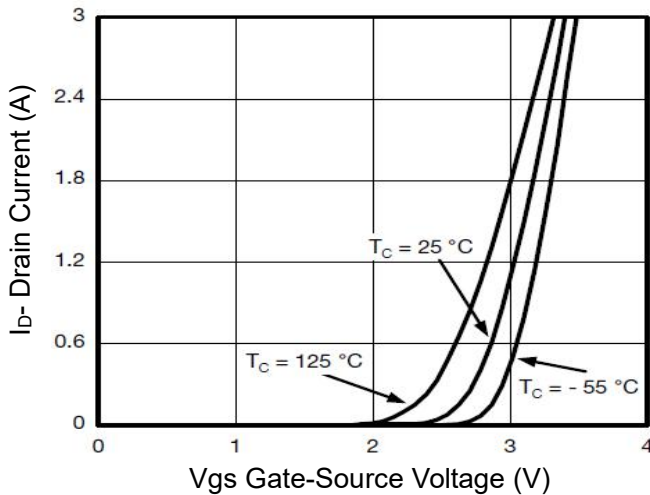
**Typical Electrical and Thermal Characteristics (Curves)**



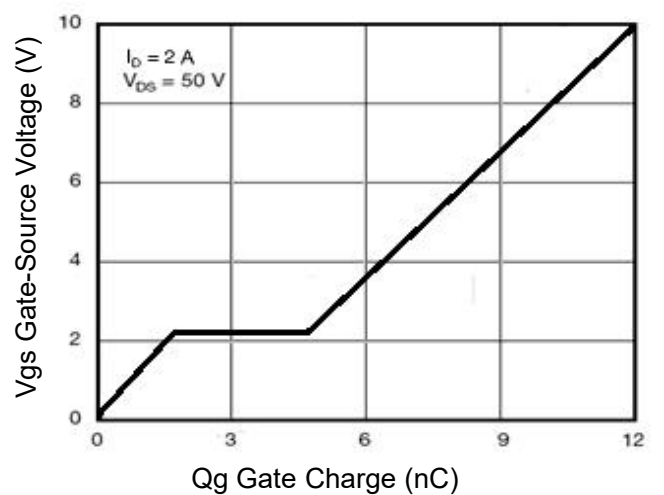
**Figure 1 Output Characteristics**



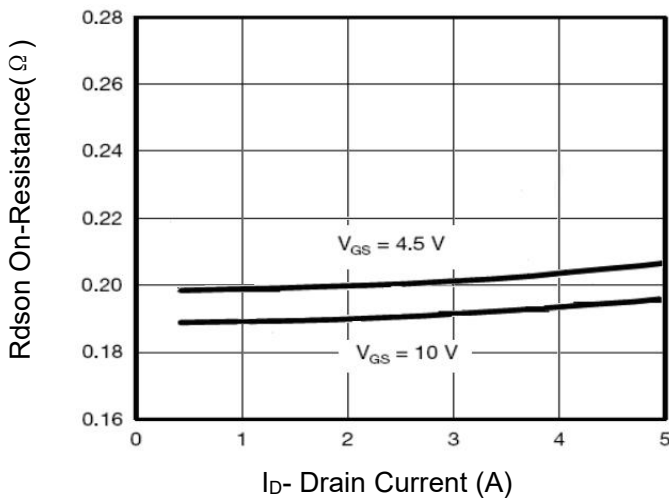
**Figure 4 Rdson-Junction Temperature**



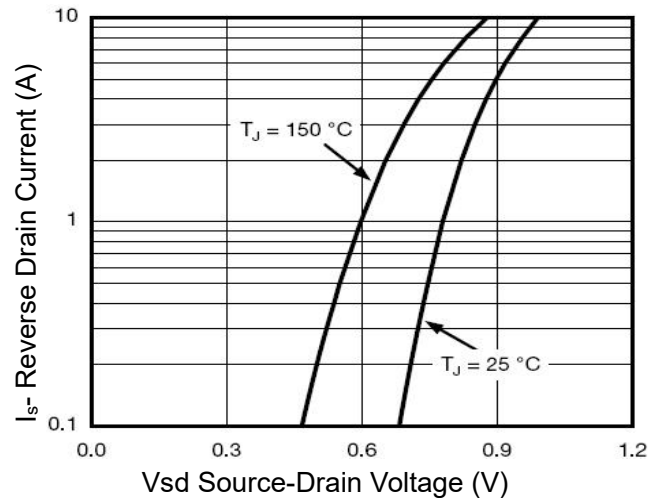
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 Rdson- Drain Current**



**Figure 6 Source- Drain Diode Forward**

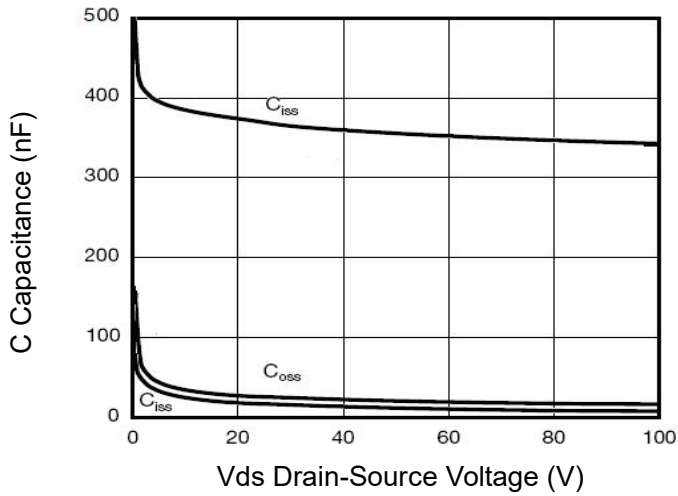


Figure 7 Capacitance vs Vds

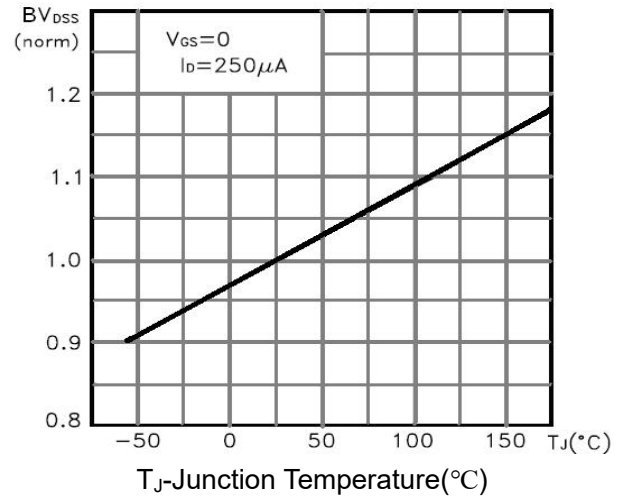


Figure 9 BV<sub>DSS</sub> vs Junction Temperature

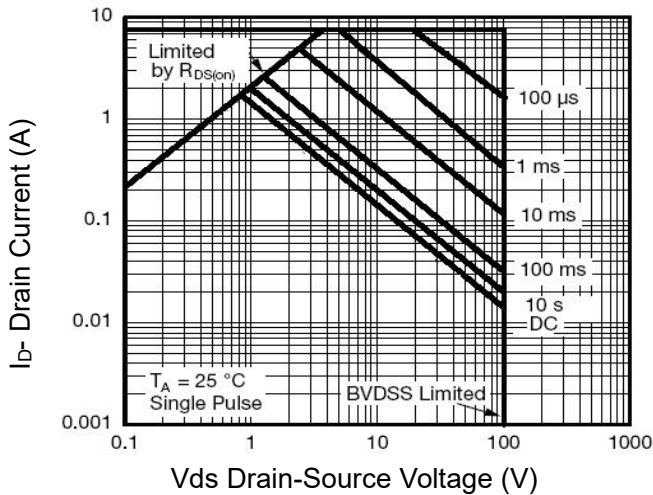


Figure 8 Safe Operation Area

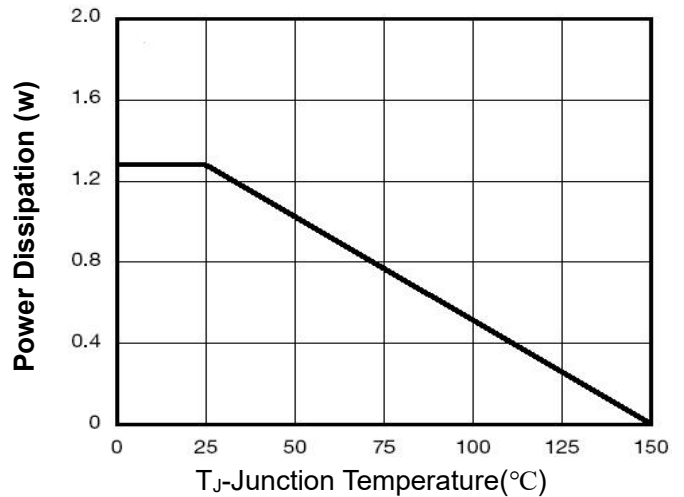


Figure 10 Power De-rati

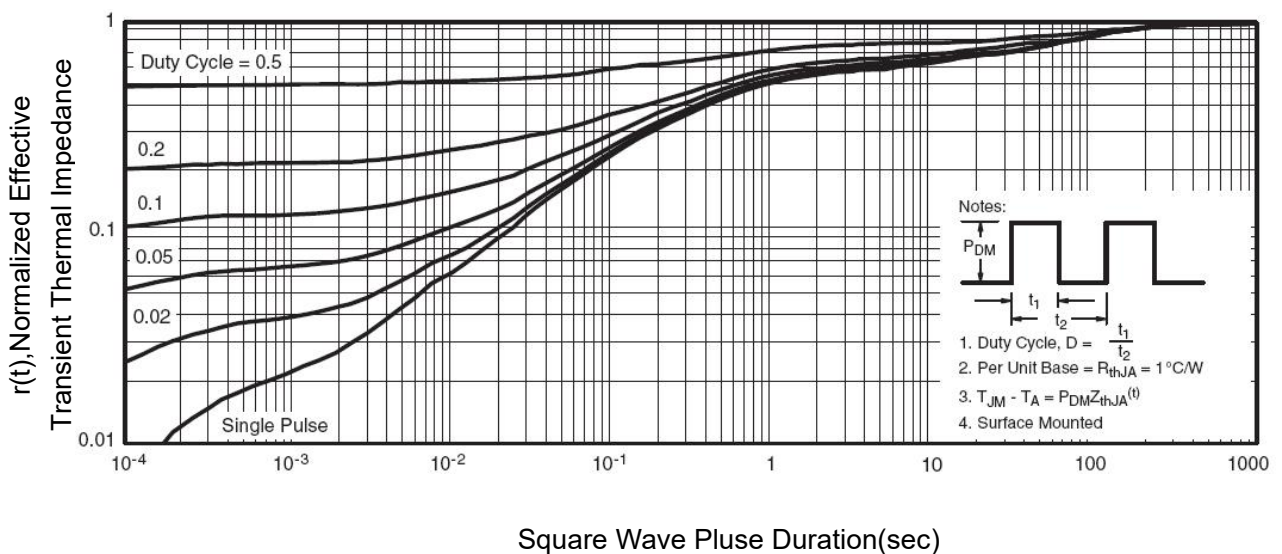
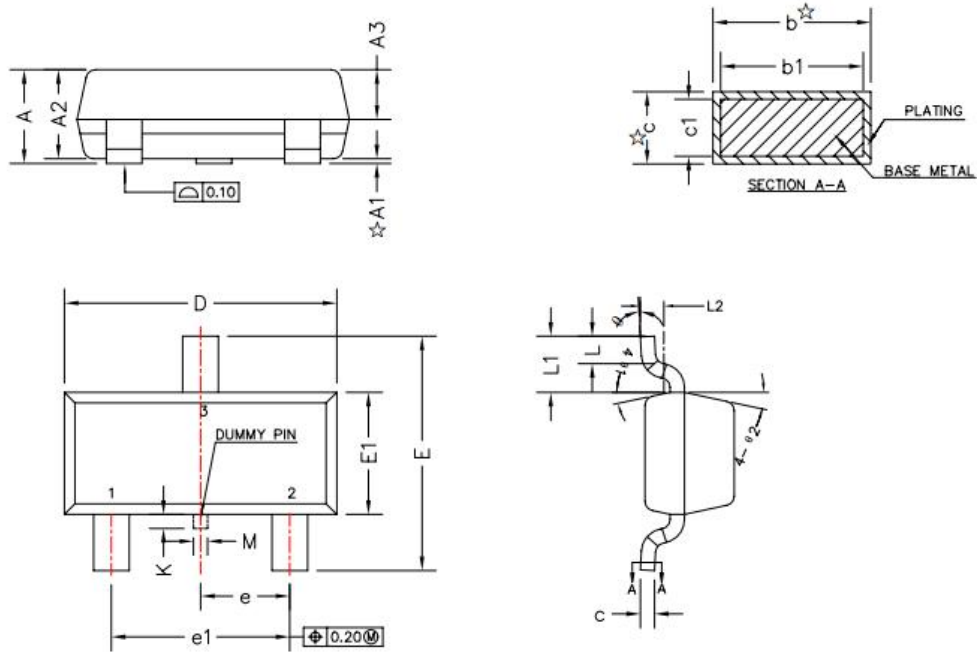


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



Symbol	Millimeters	
	Min.	Max.
A	0.89	1.12
A1	0.01	0.10
A2	0.88	1.02
A3	0.43	0.63
b	0.36	0.50
b1	0.35	0.45
c	0.14	0.20
c1	0.14	0.16
D	2.80	3.00
E	2.35	2.64
E1	1.20	1.40
e	0.90	1.00
e1	1.80	2.00
L	0.40	0.60
L1	0.6REF	
L2	0.25BSC	
M	0.10	0.25
K	0.00	0.25
$\theta$	0°	8°
$\theta_1$	10°	14°
$\theta_2$	10°	14°

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