

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

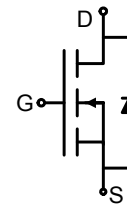
The NCE0102A uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

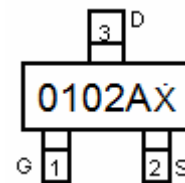
- $V_{DS} = 100V, I_D = 2A$   
 $R_{DS(ON)} < 240m\Omega @ V_{GS}=10V$  (Typ:220m $\Omega$ )
- High density cell design for ultra low  $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

### 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
0102A X	NCE0102A	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 ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

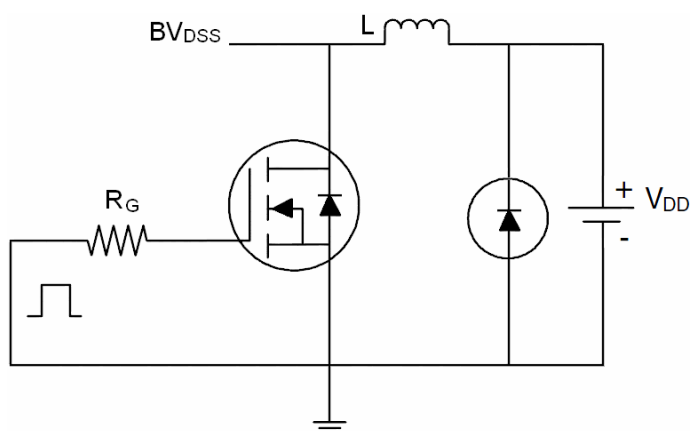
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	100	110	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	2.7	3.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	220	240	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =2A	1	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, F=1.0MHz	-	406	-	PF
Output Capacitance	C <sub>OSS</sub>		-	19	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	12	-	PF
Switching Characteristics (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	-	7	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	12	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	13	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	9	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =2A, V <sub>GS</sub> =10V	-	13.6		nC
Gate-Source Charge	Q <sub>gs</sub>		-	3.1	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	2.9	-	nC
Drain-Source Diode Characteristics						
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:

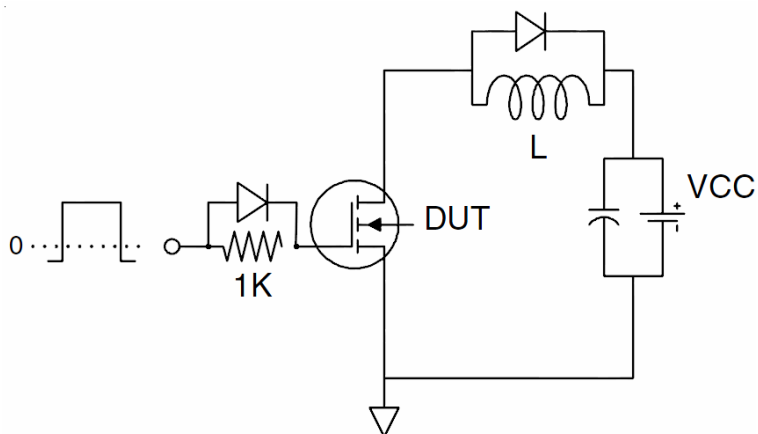
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

## Test Circuit

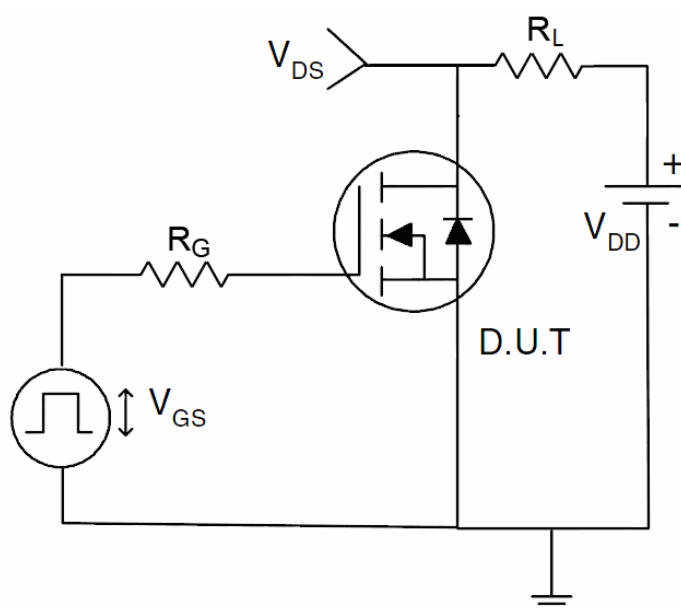
### 1) $E_{AS}$ test circuit



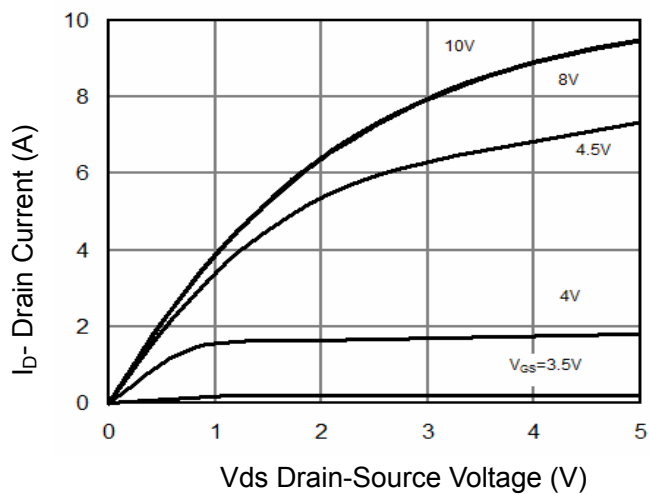
### 2) Gate charge test circuit



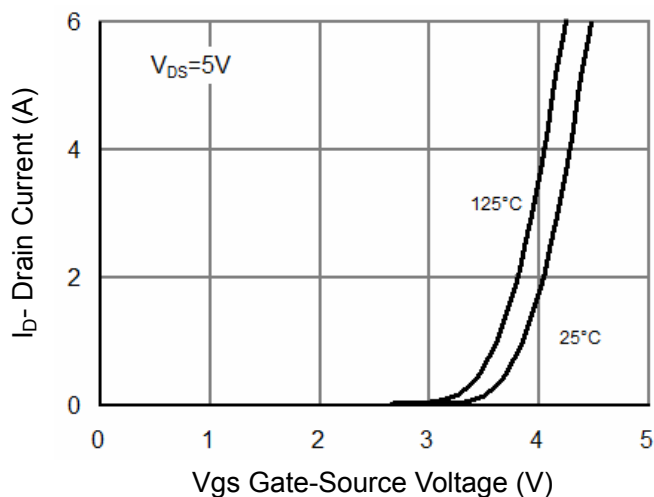
### 3) Switch Time Test Circuit



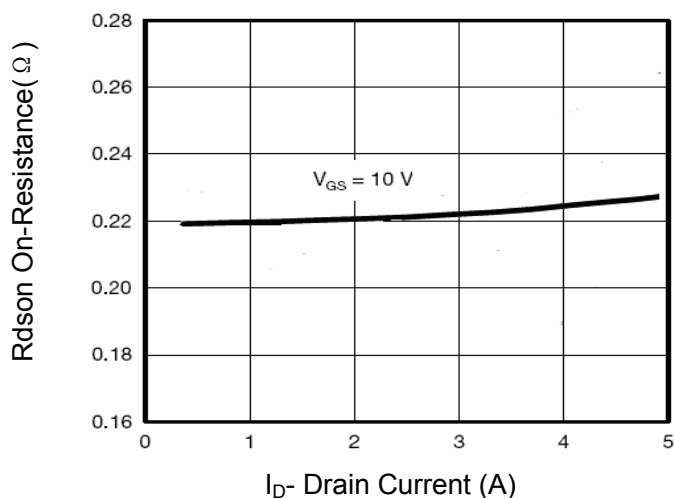
## Typical Electrical and Thermal Characteristics (Curves)



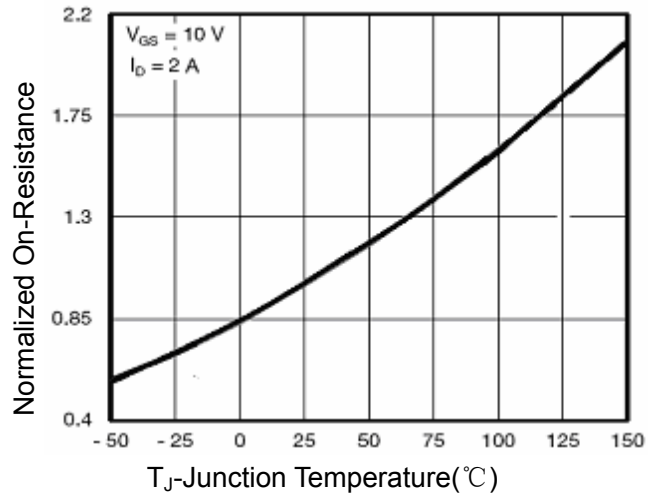
**Figure 1 Output Characteristics**



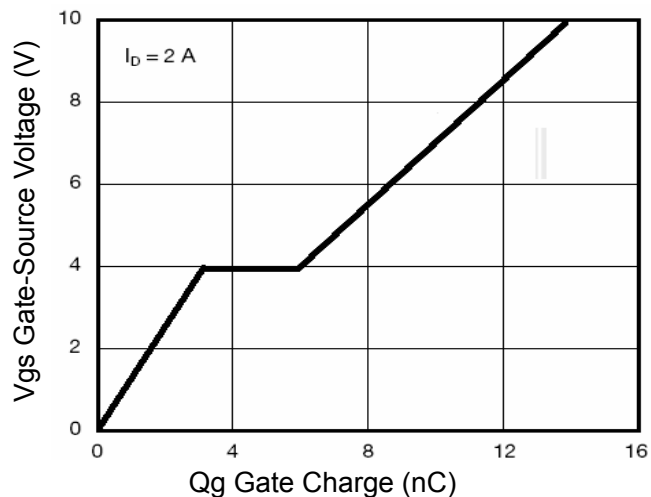
**Figure 2 Transfer Characteristics**



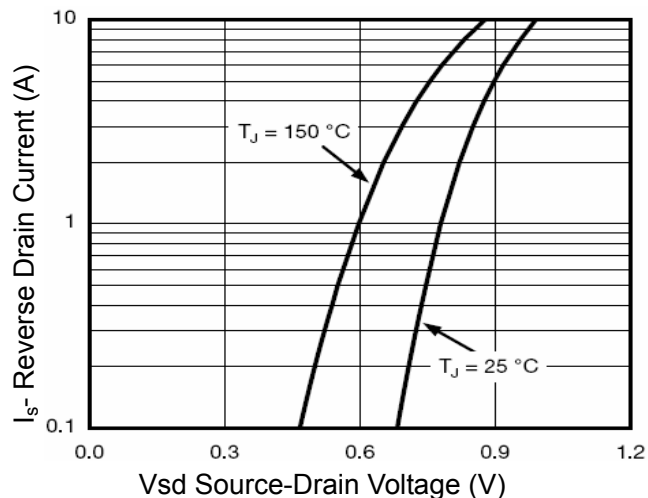
**Figure 3 Rdson- Drain Current**



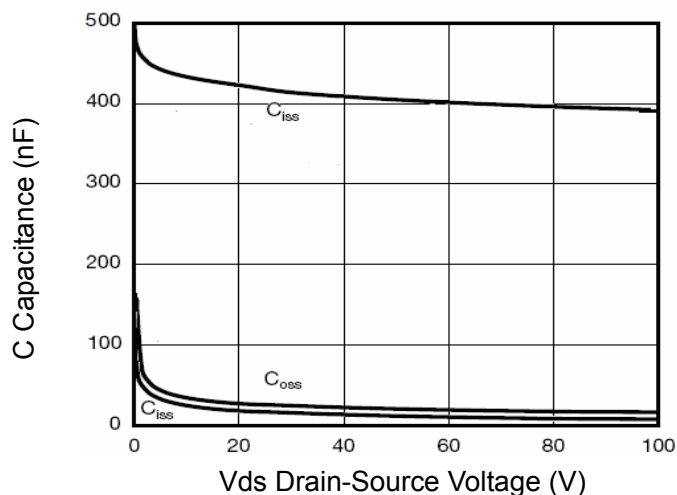
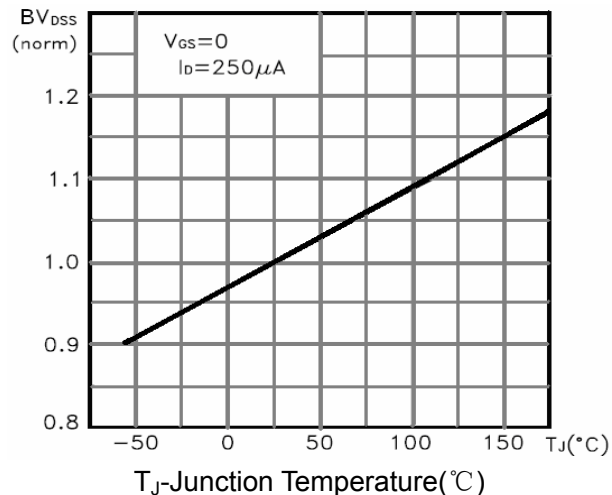
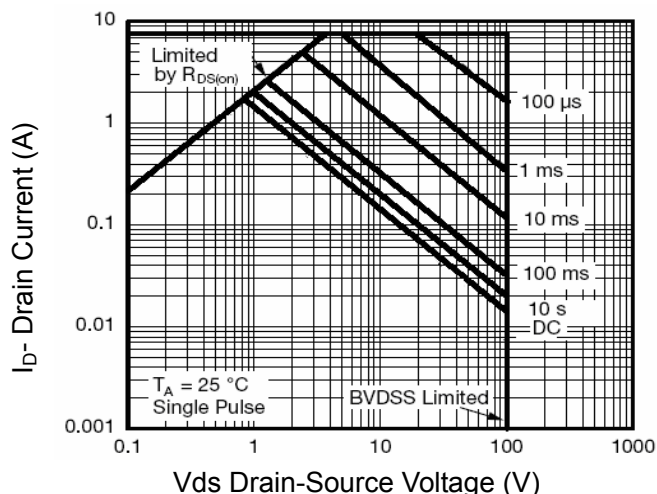
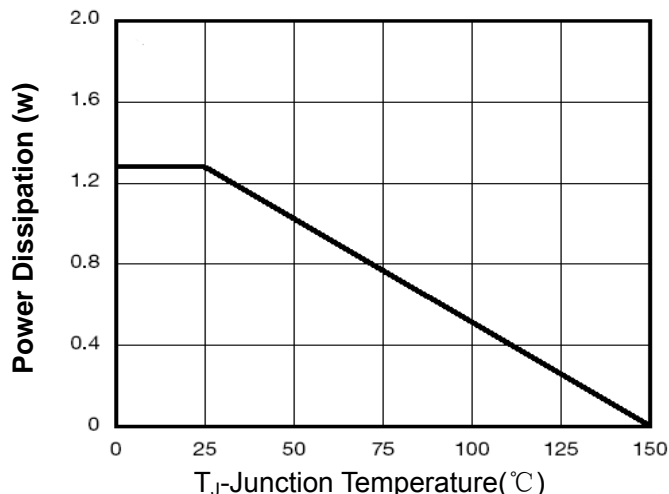
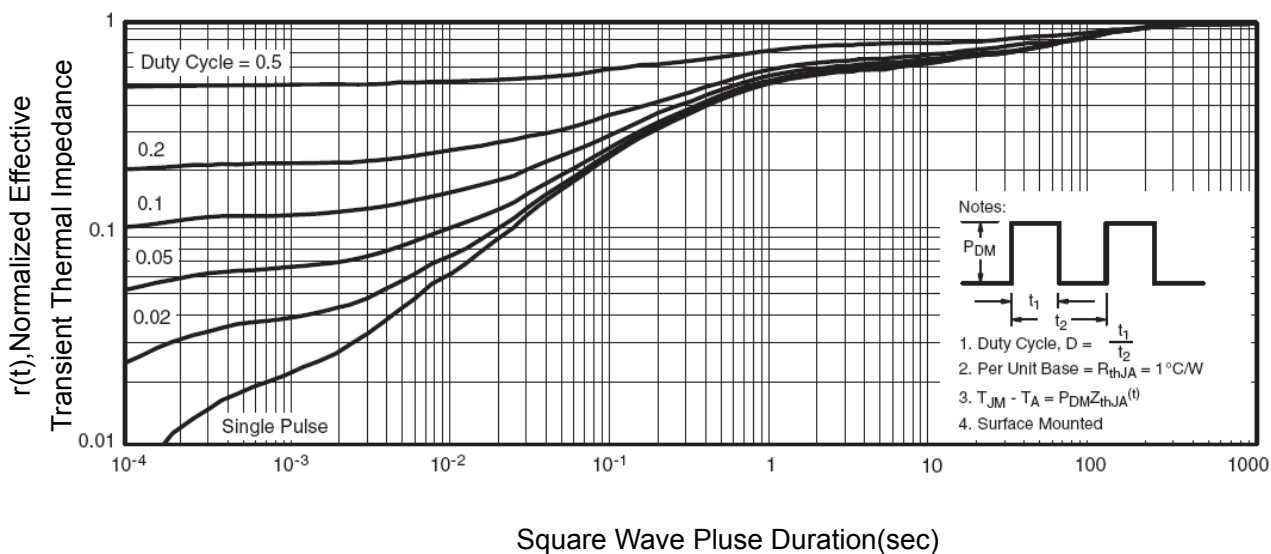
**Figure 4 Rdson-Junction Temperature**



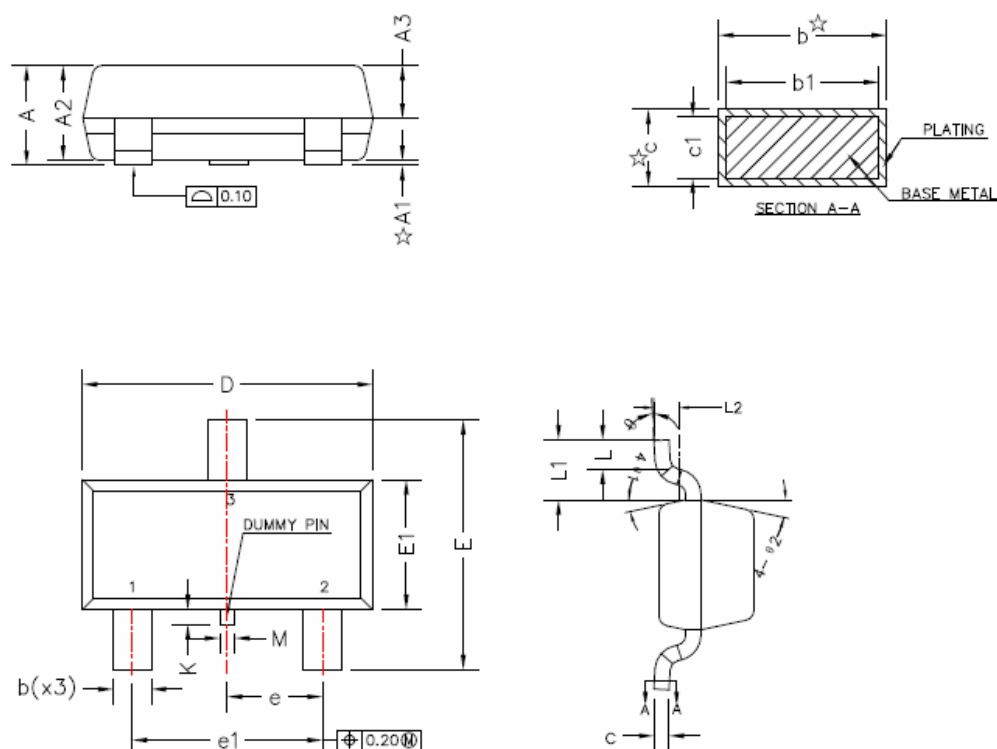
**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**


**Figure 7 Capacitance vs Vds**

**Figure 9  $BV_{DSS}$  vs Junction Temperature**

**Figure 8 Safe Operation Area**

**Figure 10 Power De-ratin**

**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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