



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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## Product Summary

BV <sub>DSS</sub>	R <sub>Ds(ON)</sub>	I <sub>D</sub> T <sub>A</sub> = +25°C
-250V	14Ω @ V <sub>GS</sub> = -10V	-265mA
	18Ω @ V <sub>GS</sub> = -3.5V	-235mA

## Features and Benefits

- High Voltage
- Low On-Resistance
- Fast Switching Speed
- Low Gate Drive
- Low Threshold

## Description and Applications

This new generation trench MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high efficiency power management applications.

- Earth recall and dialling switches
- Electronic hook switches
- High voltage power MOSFET drivers
- Telecom call routers
- Solid state relays

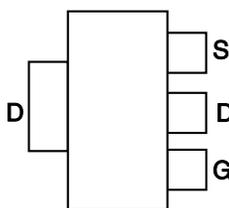
## Mechanical Data

- Package: SOT223
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish 
- Weight: 0.112 grams (Approximate)

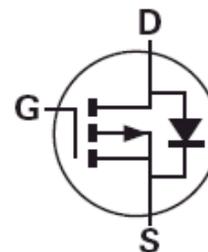
SOT223 (Type DN)



Top View



Pin Out - Top View



Equivalent Circuit

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-250	V
Gate-Source Voltage	V <sub>GSS</sub>	±40	V
Continuous Drain Current @V <sub>GS</sub> = 10V; T <sub>A</sub> = +25°C (Note 5)	I <sub>D</sub>	-265	mA
@V <sub>GS</sub> = 10V; T <sub>A</sub> = +70°C (Note 5)		-212	
Pulsed Drain Current (Note 7)	I <sub>DM</sub>	-1	A
Continuous Source Current (Body Diode)	I <sub>S</sub>	-0.265	A
Pulsed Source Current (Body Diode)	I <sub>SM</sub>	-1	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation at T <sub>A</sub> = +25°C (Note 5)	P <sub>D</sub>	2.0	W
Linear Derating Factor		16	
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	63	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	105	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-250	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-500	nA	V <sub>DS</sub> = -250V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±40V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.8	-1.5	-2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA
Static Drain-Source On-Resistance (Note 8)	R <sub>DS(ON)</sub>	—	10	14	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -200mA
		—	13	18	Ω	V <sub>GS</sub> = -3.5V, I <sub>D</sub> = -100mA
Forward Transconductance (Note 10)	g <sub>fs</sub>	80	200	—	mS	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.15A
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	—	—	0.97	V	I <sub>S</sub> = -200mA, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance (Note 10)	C <sub>iss</sub>	—	82	—	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance (Note 10)	C <sub>oss</sub>	—	16	—	pF	
Reverse Transfer Capacitance (Note 10)	C <sub>rss</sub>	—	5	—	pF	
Total Gate Charge (Notes 9 & 10)	Q <sub>g</sub>	—	3	—	nC	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -25V I <sub>D</sub> = -200mA
Gate-Source Charge (Notes 9 & 10)	Q <sub>gs</sub>	—	0.3	—	nC	
Gate-Drain Charge (Notes 9 & 10)	Q <sub>gd</sub>	—	0.5	—	nC	
Turn-On Delay Time (Notes 9 & 10)	t <sub>D(ON)</sub>	—	1.5	—	ns	V <sub>DD</sub> = -30V, I <sub>D</sub> = -200mA, V <sub>GS</sub> = -10V, R <sub>G</sub> = 50Ω
Turn-On Rise Time (Notes 9 & 10)	t <sub>r</sub>	—	4.2	—	ns	
Turn-Off Delay Time (Notes 9 & 10)	t <sub>D(OFF)</sub>	—	27	—	ns	
Turn-Off Fall Time (Notes 9 & 10)	t <sub>f</sub>	—	10	—	ns	
Reverse Recovery Time (Note 10)	t <sub>RR</sub>	—	80	—	ns	I <sub>F</sub> = -1A, di/dt = 100A/μs, T <sub>J</sub> = +25°C
Reverse Recovery Charge (Note 10)	Q <sub>rr</sub>	—	230	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300μs - pulse width limited by maximum junction temperature.
  - Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  - Switching characteristics are independent of operating junction temperature.
  - For design aid only, not subject to production testing.

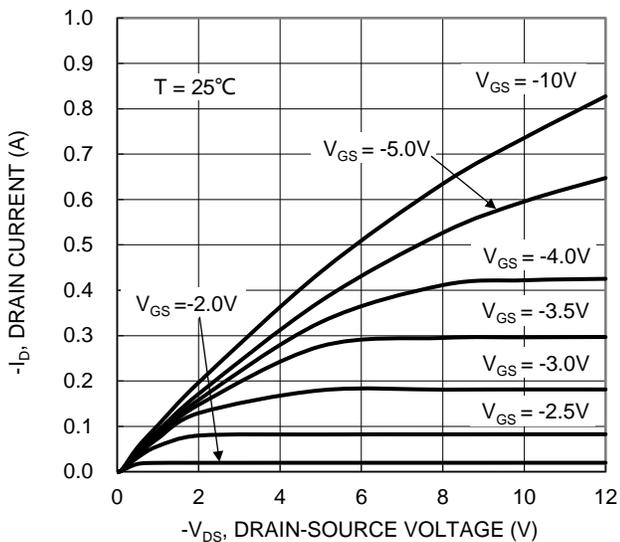


Figure 1. Typical Output Characteristic

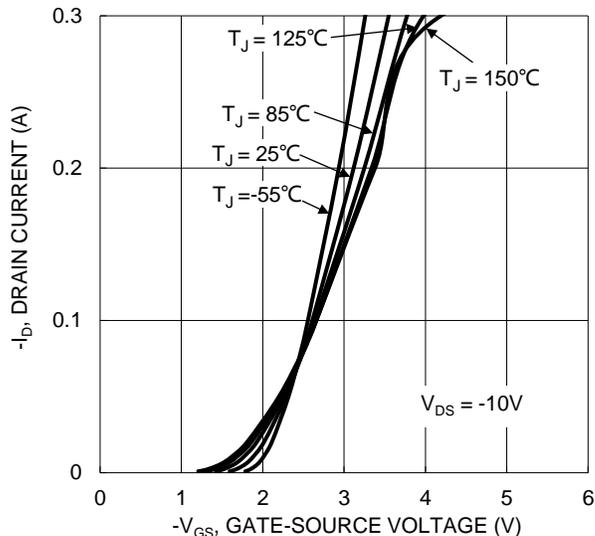


Figure 2. Typical Transfer Characteristic

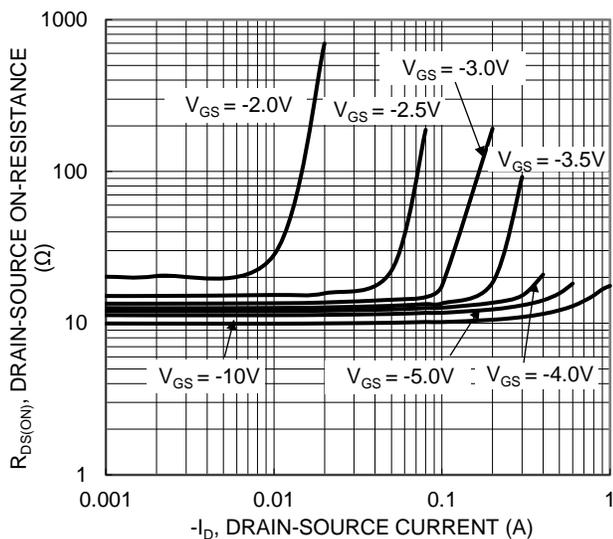


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

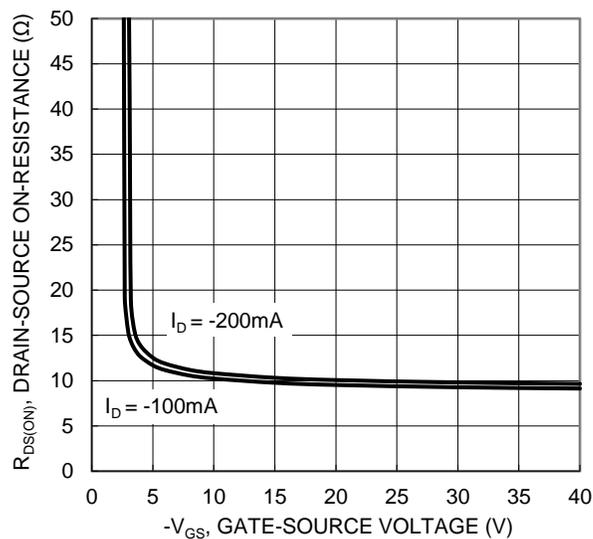


Figure 4. Typical Transfer Characteristic

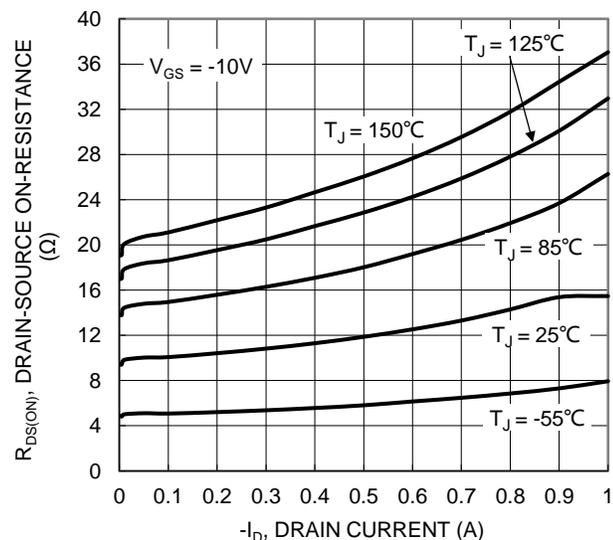


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

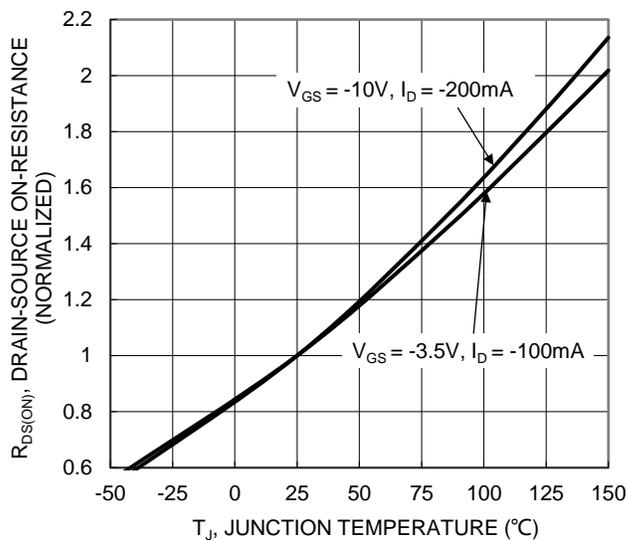


Figure 6. On-Resistance Variation with Temperature

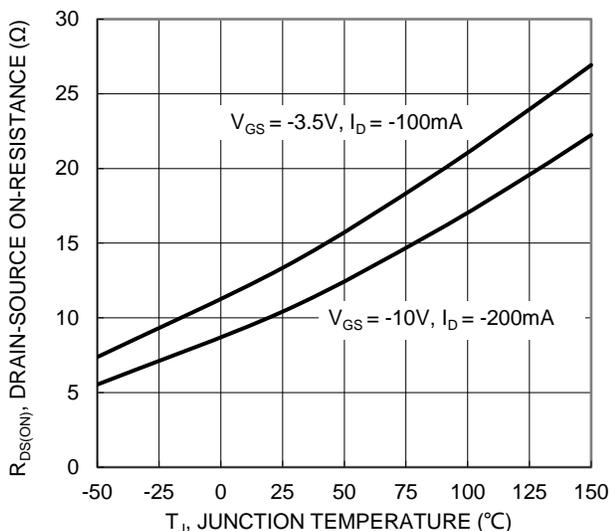


Figure 7. On-Resistance Variation with Temperature

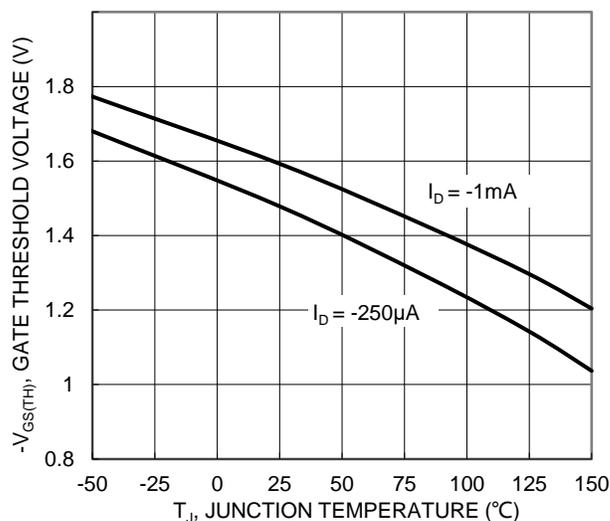


Figure 8. Gate Threshold Variation vs. Junction Temperature

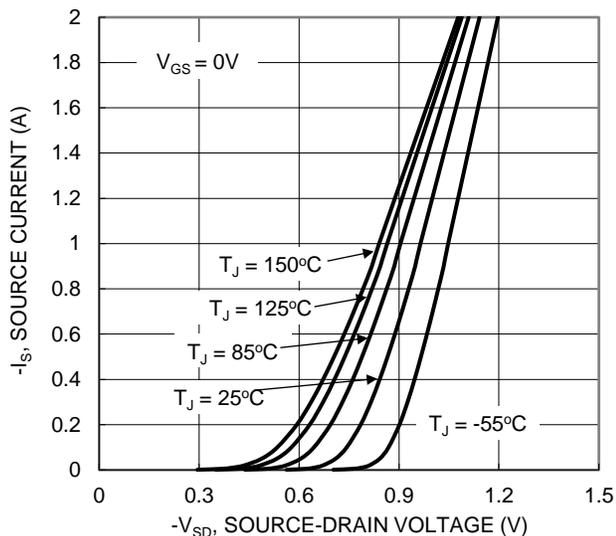


Figure 9. Diode Forward Voltage vs. Current

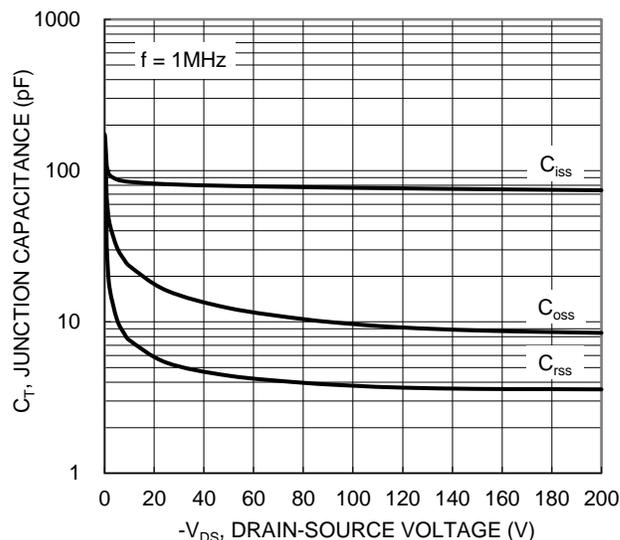


Figure 10. Typical Junction Capacitance

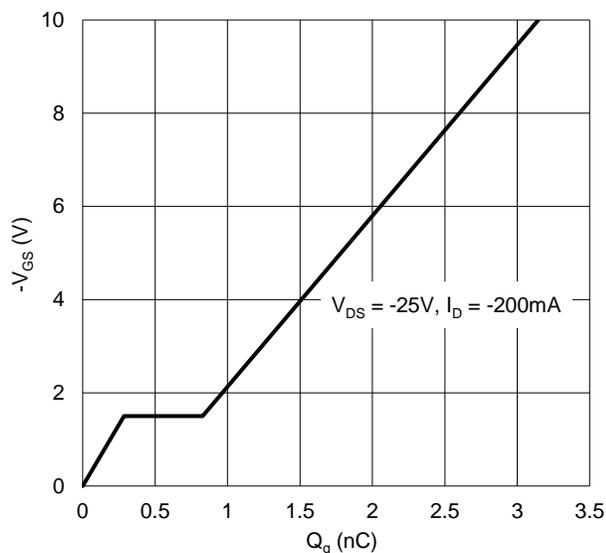


Figure 11. Gate Charge

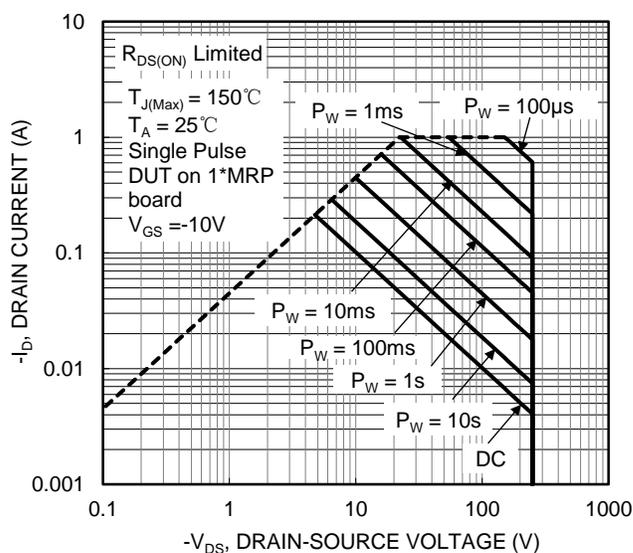


Figure 12. SOA, Safe Operation Area

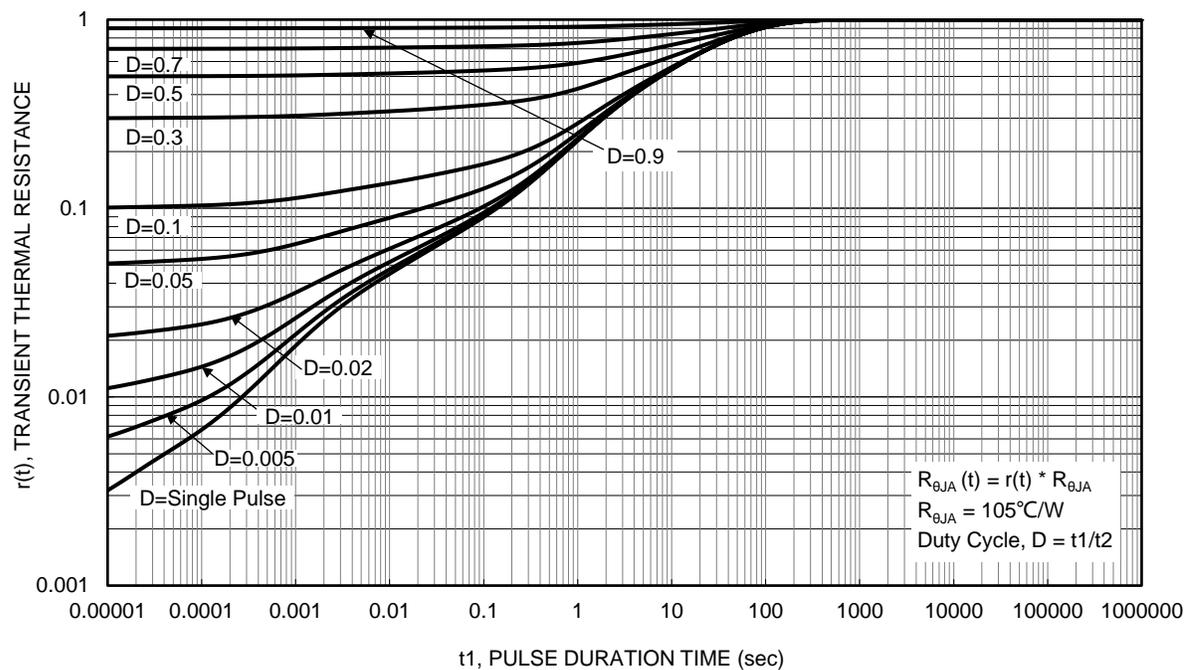
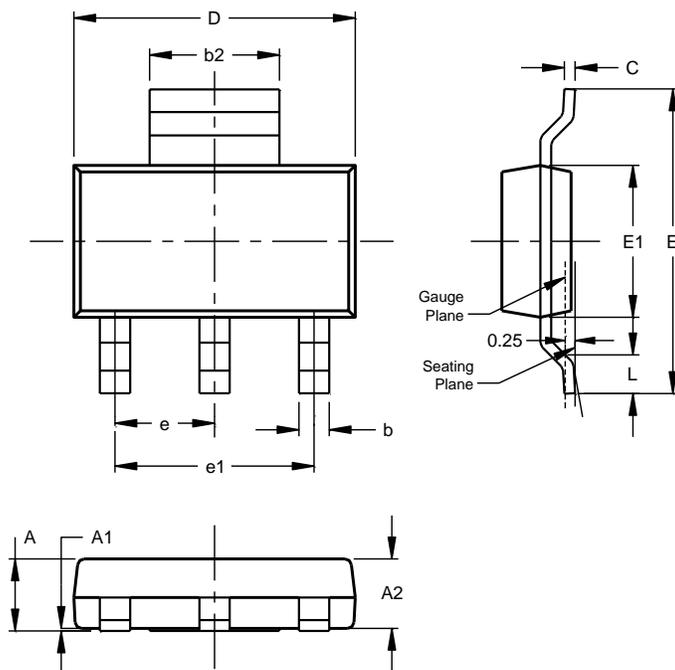


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

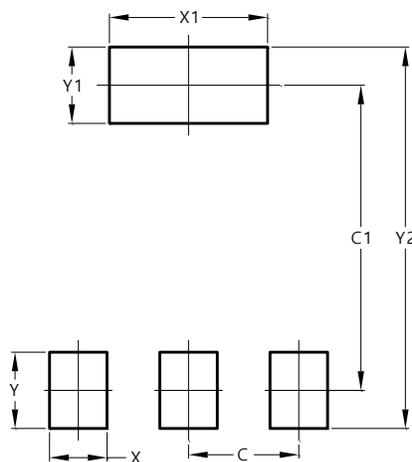
**SOT223 (Type DN)**



SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

## Suggested Pad Layout

**SOT223 (Type DN)**



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00