

## SCM9602A Ultra-high Voltage Start-up Controller

### Features

- Ideal for applications requiring an ultra-wide input voltage range (40V<sub>DC</sub> to 700V<sub>DC</sub>)
- Low-cost design featuring large starting current in small physical package

### Package



Mechanical package: SOT-23  
(see "Ordering information" for details).

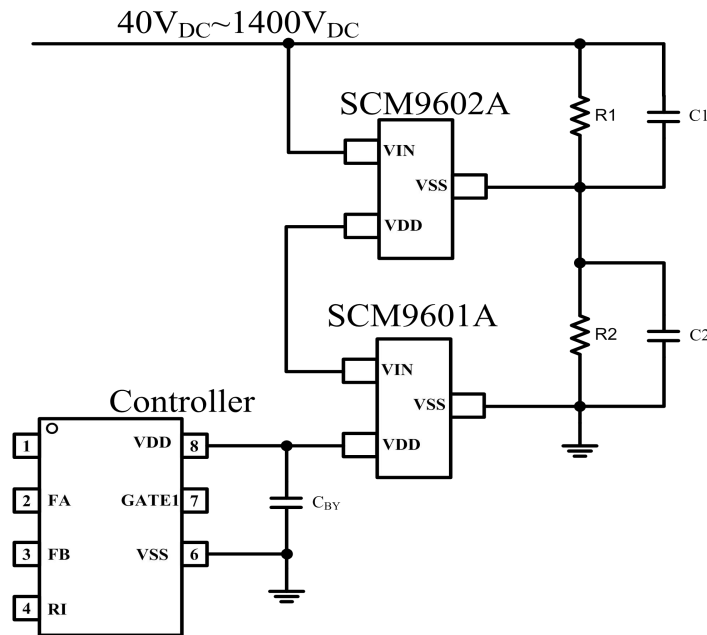
### Applications

- Used for converters with ultra-wide input voltage of 40V<sub>DC</sub> to 700V<sub>DC</sub>.

### Functional Description

The SCM9602A chip can be used to increase the input voltage range from 40V<sub>DC</sub> to 5,000V<sub>DC</sub> when used in combination with our SCM9601A.

### Typical Application Circuit

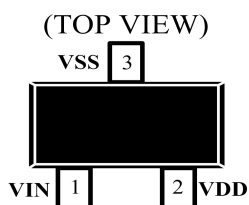


Application shown with an Input Voltage of 40V<sub>DC</sub> to 1400V<sub>DC</sub> where SCM9601A and SCM9602A are combined and connected in series

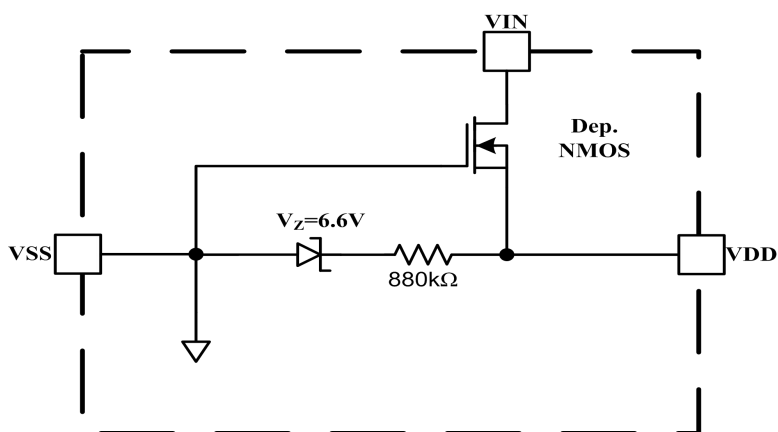
## Contents

Features and Package.....	1	Electrical Characteristics.....	3
Application.....	1	Typical Curve.....	3
Functional Description.....	1	Parameter Test Circuit.....	3
Typical Application Circuit.....	1	Application Circuit.....	4
Pins and Descriptions.....	2	Suggestions on Power Supply Use.....	4
Absolute Maximum Ratings.....	2	Ordering ,Package and Tape & Reel Information.....	5
Recommended Operating Conditions.....	2		

### Pins



### Internal Block Diagram



### Pin descriptions

Pin No.	Pin name	I/O	Description
1	VIN	P	The high voltage input obtains power from the input voltage and charges the bypass capacitor of the VDD pin to start the controller.
2	VDD	P	Power pin.
3	VSS	P	IC Ground connection.

### Absolute Maximum Ratings

General test conditions: Free-air, normal operating temperature range (unless otherwise specified).

Parameter	Symbol	Min	Max	Unit
Bias mains voltage	$V_{VDD}$		40	V
Voltage at the VIN pin	$V_{VIN}$		700	
Operating junction temperature	$T_J$	-40	150	°C
Storage temperature	$T_{STG}$	-40	150	
Soldering Temperature (Allowable reflow soldering temperature of chip within 10 seconds)			260	
Electrostatic Discharge (ESD) rating	Human body model (HBM)		2000	V
	Charging device model (CDM)		1000	

## Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Bias mains voltage	$V_{VDD}$	9	20	V
Operating junction temperature	$T_J$	-40	125	°C

## Electrical Characteristics

Test conditions: Free-air, normal operating temperature range,  $V_{VSS}=0V$  (unless otherwise specified).

Symbol	Parameter	Test condition	Min	Typ	Max	Unit
$V_{BR}$	Breakdown voltage of the VIN pin	$V_{VSS} = -8V, I_{VIN} = 10\mu A, V_{VDD} = 0V$	700	-	-	V
$V_{TH}$	Threshold voltage	$V_{VIN} = 40V, I_{VDD} = 1\mu A$	2.7	3.7	4.7	V
$I_{STH}$	Maximum starting current	$V_{VIN} = 40V, V_{VDD} = 0V$	1	2	4	mA
$I_{DSS}$	Leak current of the leakage source	$V_{VSS} = -8V, V_{VIN} = 700V, V_{VDD} = 0V$	-	-	2	uA

## Typical Curve

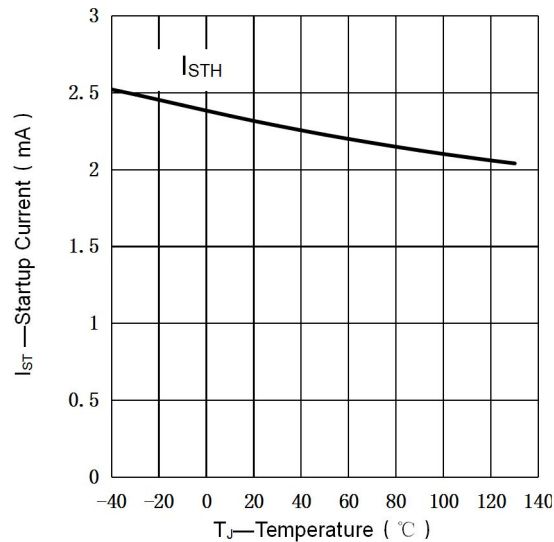


Fig. 1 Starting Current VS Temperature

## Parameter Test Circuit

Refer to Fig.2,3,4 and 5 for electrical characteristics related test circuits. The test conditions are normal temperature and closed-loop.

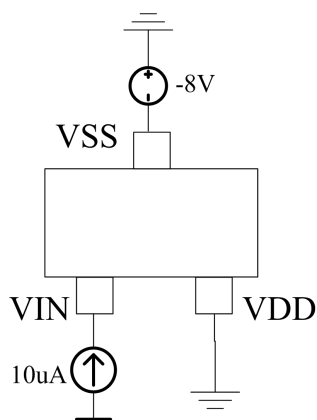


Fig. 2 Leakage Source Breakdown Volt Test Circuit

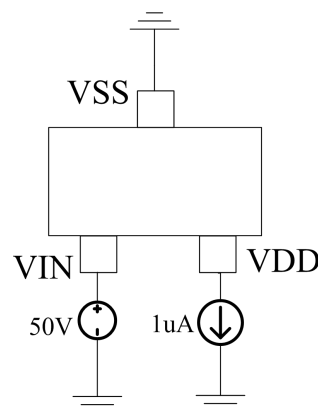


Fig. 3 Value Voltage Test Circuit

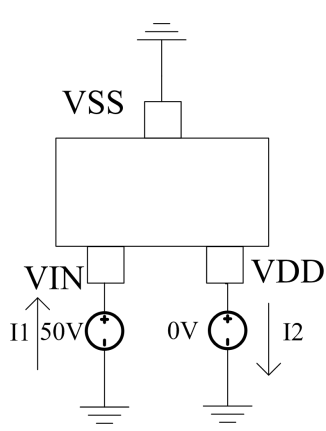


Fig. 4 High Start-up Current Test Circuit

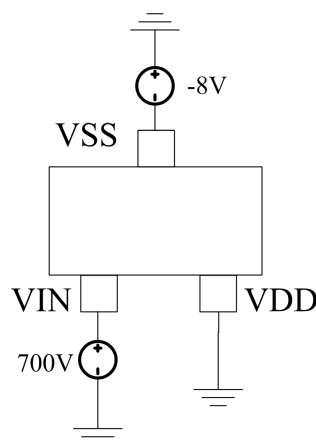


Fig. 5 Leakage Current Test Circuit

## Application Circuit

When applying SCM9602A, need to match with our SCM9602A. See Fig. 6 for details. C1 and C2 are high energy storage capacitors at the input end, reducing the fluctuation amplitude of input voltage; R1, R2 is a voltage equalizing resistor which avoids the uneven voltage caused by the difference of leakage current between C1 and C2; D1, D2 and D3 are in rabbits to solve the problem of leakage current difference between C1 and C2.

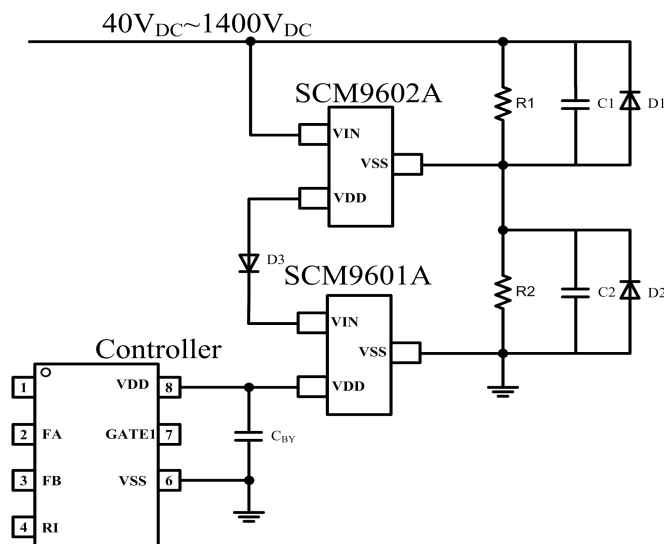


Fig.6 Input  $40V_{DS} \sim 1400V_{DS}$  Application Circuit (SCM9601A and SCM9602A in Series)

## Suggestions of Power Supply

1. SCM9602A can not be used in high voltage start-up circuit alone. In practical use, it is recommended to match our company SCM9601A, which can be used in ultra-high input voltage situations.
2. When SCM9601A and SCM9602A are used in series, the leakage current difference between capacitors C1 and C2 should be considered.

## Ordering Information

Part number	Package	Number of pins	Product Marking	Tape & Reel
SCM9602ATA	SOT-23	3	9602	3K/REEL

Product marking and date code

SCM9602XYZ:

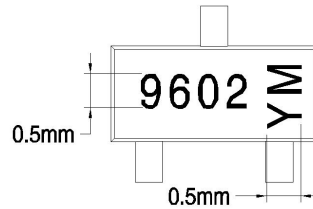
(1) SCM9602 = Product designation.

(2) X = Version code information (A-Z).

(3) Y = Packaging definition code; T for SOT package.

(4) Z = Operating temperature range (C = 0°C to +70°C, I = -40°C to +85°C, A = -40°C to +125°C, M = -55°C to +125°C).

## Silk Screen Information



Note:

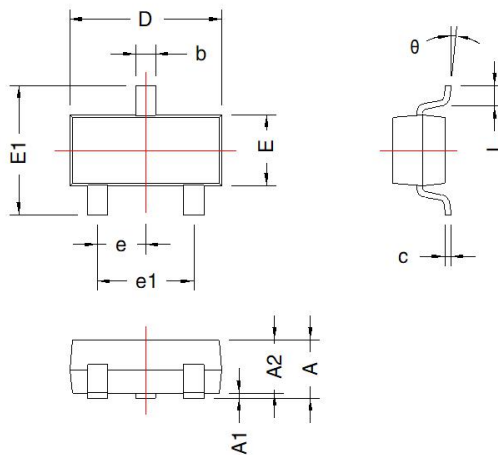
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2、Character size:

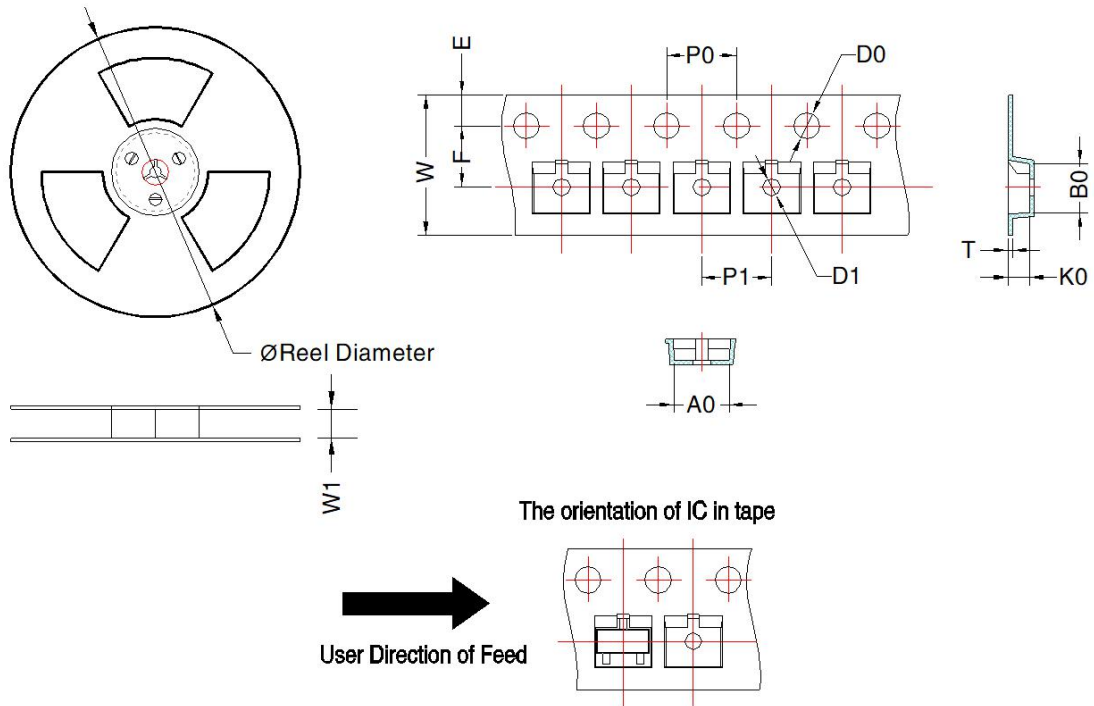
Height: 0.5mm, Spacing: 0.1mm

## Package Information (SOT-23)

THIRD ANGLE PROJECTION



Mark	SOT-23			
	Dimension(mm)		Dimension(inch)	
	Min	Max	Min	Max
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
A2	0.90	1.05	0.035	0.041
D	2.80	3.00	0.110	0.118
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
L	0.30	0.50	0.012	0.020
b	0.30	0.50	0.012	0.020
e	0.95 TYP		0.037 TYP	
e1	1.80	2.00	0.071	0.079
c	0.08	0.15	0.003	0.006
θ	0°	8°	0°	8°



Device	Package Type	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	T (mm)	W (mm)	E (mm)	F (mm)	P1 (mm)	P0 (mm)	D0 (mm)	D1 (mm)
SCM9602ATA	SOT-23	3000	180.0	8.5	3.15 ± 0.1	2.77 ± 0.1	1.22 ± 0.1	0.25 ± 0.03	8.0 ± 0.3	1.75 ± 0.1	3.5 ± 0.1	4 ± 0.1	4 ± 0.1	1.5 ± 0.1	1.0 ± 0.1

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