

## Features

- Up to 480V voltage capability
- Constant output current (4.5mA)
- Programmable upper threshold level
- Fixed lower threshold (4.2V)
- ENN input
- Over-temperature shutdown
- Ultra-low off current (2.5 $\mu$ A)
- Internal 20.8V clamp on VOUT pin
- Excellent latch immunity on all inputs & outputs
- Integrated ESD protection on all pins
- 5-pin SOT-23 package

## Description

The IRS25751 is a 480V high-voltage start-up IC ideal for supplying initial supply starting current from a high-voltage bus. The IRS25751 supplies a constant current during start-up and then consumes ultra-low standby (off) current. Additional features include programmability of the upper turn-off threshold, an ENN input, and over-temperature protection. IR's proprietary HVIC technology provides robust operation from high input voltage levels with simple yet flexible features.

## Applications

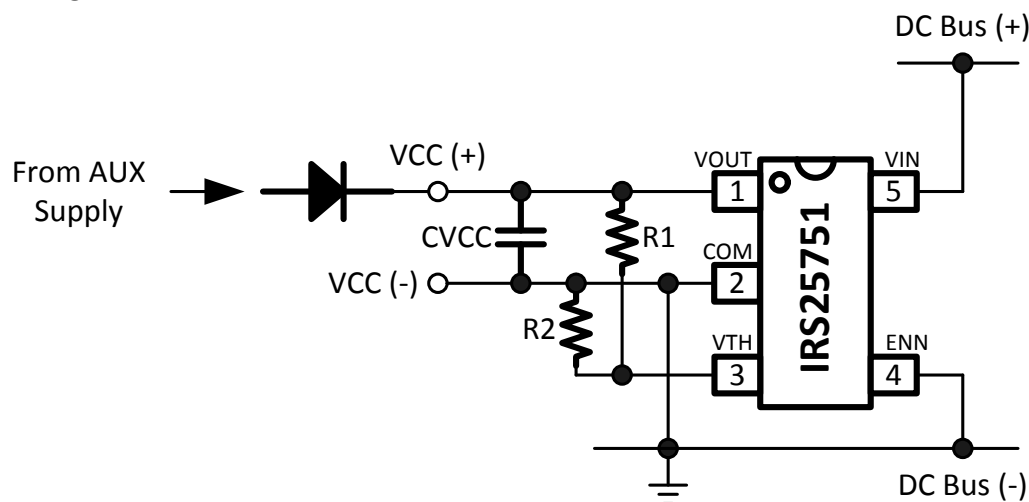
- High-voltage start-up
- Low standby power circuits
- General purpose switched mode power electronics

## Package Options



5-Pin SOT-23

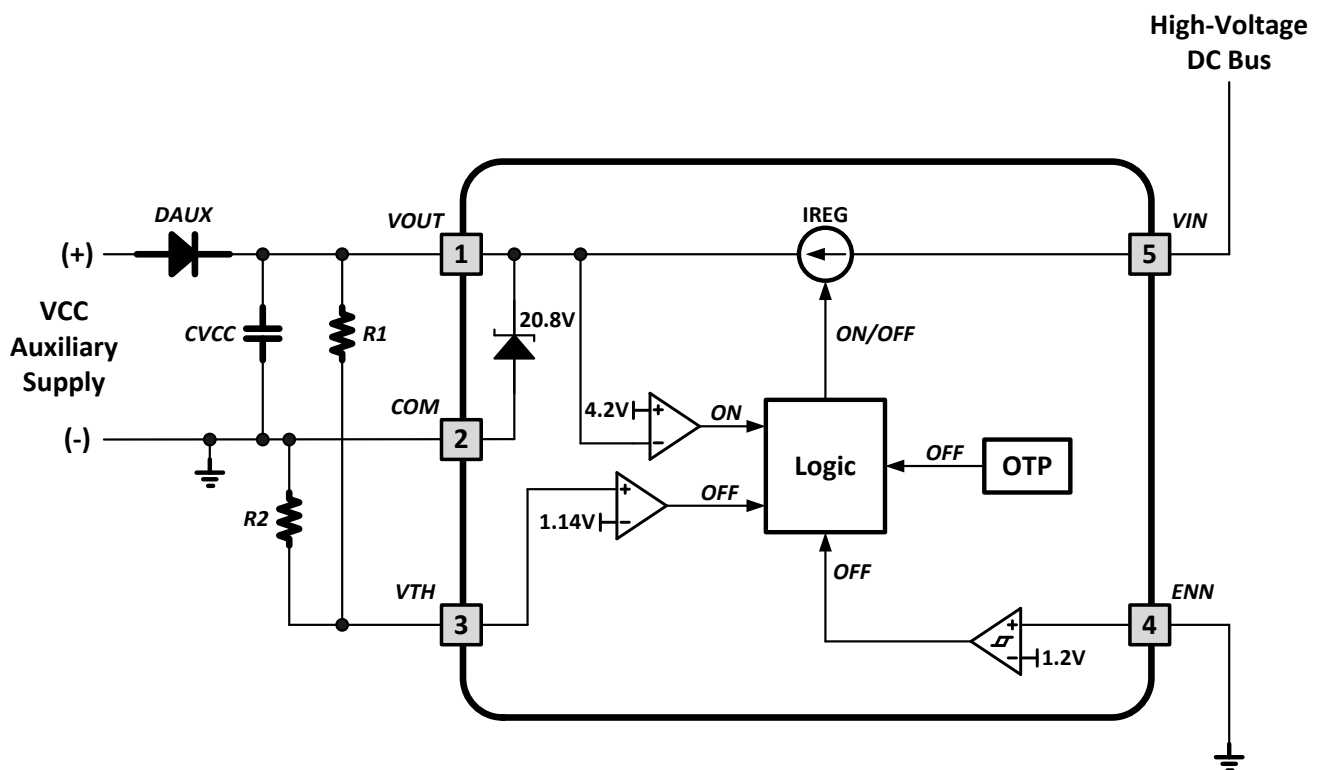
## Application Diagram



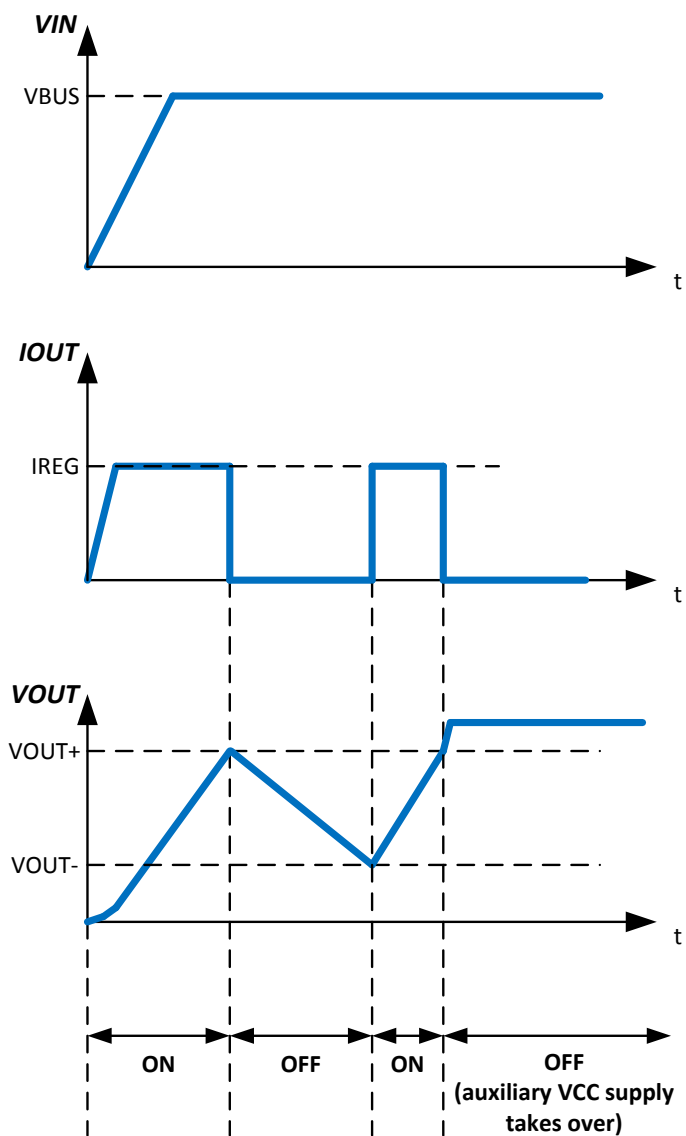
## Ordering Information

| Base Part Number | Package Type | Standard Pack |          | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
|                  |              | Form          | Quantity |                       |
| IRS25751LPBF     | 5L-SOT-23    | Tape and Reel | 3000     | IRS25751LTRPBF        |

# Functional Block Diagram



# Timing Diagram (VIN, IOUT, VOUT)



**Qualification Information<sup>†</sup>**

|                                   |                  |                                                                                                                                                                     |                                                   |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| <b>Qualification Level</b>        |                  | Industrial <sup>††</sup><br>(per JEDEC JESD 47E)                                                                                                                    |                                                   |
|                                   |                  | Comments: This family of ICs has passed JEDEC's Industrial qualification. IR's Consumer qualification level is granted by extension of the higher Industrial level. |                                                   |
| <b>Moisture Sensitivity Level</b> |                  | SOT-23                                                                                                                                                              | MSL1 <sup>†††</sup><br>(per IPC/JEDEC J-STD-020C) |
| <b>ESD</b>                        | Machine Model    | Class B<br>(per JEDEC standard EIA/JESD22-A115-A)                                                                                                                   |                                                   |
|                                   | Human Body Model | Class 2<br>(per EIA/JEDEC standard JESD22-A114-B)                                                                                                                   |                                                   |
| <b>IC Latch-Up Test</b>           |                  | Class I, Level A<br>(per JESD78A)                                                                                                                                   |                                                   |
| <b>RoHS Compliant</b>             |                  | Yes                                                                                                                                                                 |                                                   |

† Qualification standards can be found at International Rectifier's web site <http://www.irf.com/>

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information.

††† Higher MSL ratings may be available for the specific package types listed here. Please contact your International Rectifier sales representative for further information.

## Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM, all currents are defined positive into any pin. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

| Symbol | Definition                                 |           | Min. | Max.                | Units |
|--------|--------------------------------------------|-----------|------|---------------------|-------|
| VIN    | VIN pin voltage                            |           | -0.3 | 625                 | V     |
| VOUT   | VOUT pin voltage                           |           |      | VCLAMP <sup>†</sup> |       |
| VTH    | VTH pin voltage                            |           |      | VOUT + 0.3          |       |
| ENN    | ENN pin voltage                            |           |      |                     |       |
| RΘja   | Thermal resistance, junction to ambient    | 5L-SOT-23 | ---  | 191                 | °C/W  |
| TJ     | Junction temperature                       |           | -55  | 150                 | °C    |
| TS     | Storage temperature                        |           |      |                     |       |
| TL     | IC Pin temperature (soldering, 10 seconds) |           | ---  | 300                 |       |

† This IC contains voltage clamp structures between the VOUT and COM pins that has a nominal breakdown voltage of 20.8V. Please note that this pin should not be driven by a DC, low impedance power source greater than the VCLAMP specified in the Electrical Characteristics section.

## Recommended Operating Conditions

For proper operation the device should be used within the recommended conditions.

| Symbol         | Definition           | Min. | Max.   | Units |
|----------------|----------------------|------|--------|-------|
| VIN            | VIN pin voltage      | -0.3 | 480    | V     |
| VOUT           | VOUT pin voltage     | COM  | VCLAMP |       |
| VTH            | VTH pin voltage      |      | VOUT   |       |
| VENN           | ENN pin voltage      |      |        |       |
| T <sub>J</sub> | Junction temperature | -40  | 125    | °C    |

## Recommended Component Values

| Symbol | Component                    | Min. | Typ. | Max. | Units   |
|--------|------------------------------|------|------|------|---------|
| R1     | VTH pin programming resistor | ---  | 1.0  | ---  | Meg Ohm |
| R2     | VTH pin programming resistor | ---  | 90.9 | ---  | K Ohm   |
| CVCC   | VOOUT pin external capacitor | ---  | 10.0 | ---  | μF      |

## Electrical Characteristics

R1 = 1Meg Ohm, R2 = 90.9K Ohm, Ta = 25 °C unless otherwise specified. All parameters are referenced to COM pin.

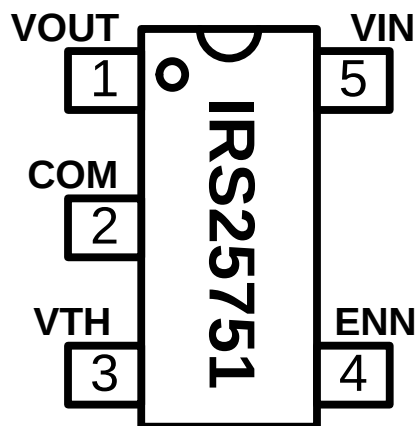
| Symbol                             | Definition                                       | Min  | Typ  | Max  | Units | Test Conditions           |
|------------------------------------|--------------------------------------------------|------|------|------|-------|---------------------------|
| <b>VOUT Pin Characteristics</b>    |                                                  |      |      |      |       |                           |
| VOUT-                              | VOUT pin falling turn-on threshold               | 3.78 | 4.2  | 4.62 | V     | VIN = COM,<br>IVOUT = 5mA |
| VCLAMP                             | VOUT pin internal clamp voltage                  | 19.8 | 20.8 | 21.8 |       |                           |
| I <sub>REG</sub>                   | Regulated output current                         | ---  | 4.6  | ---  | mA    | VIN = 400V,<br>VOUT = COM |
| <b>VIN Pin Characteristics</b>     |                                                  |      |      |      |       |                           |
| I <sub>VIN_OFF</sub>               | VIN pin off-state leakage current                | ---  | 2.5  | ---  | μA    | VIN = 400V                |
| <b>VTH Pin Characteristics</b>     |                                                  |      |      |      |       |                           |
| VTH+                               | VTH pin rising turn-off threshold                | 1.08 | 1.14 | 1.2  | V     |                           |
| <b>ENN Pin Characteristics</b>     |                                                  |      |      |      |       |                           |
| VENN+                              | ENN pin rising disable threshold                 | ---  | 1.2  | ---  | V     |                           |
| <b>Over-Temperature Protection</b> |                                                  |      |      |      |       |                           |
| T <sub>JSD</sub>                   | Junction temperature thermal shutdown            | ---  | 155  | ---  | °C    |                           |
| T <sub>JSD_HYS</sub>               | Junction temperature thermal shutdown hysteresis | ---  | 50   | ---  |       |                           |



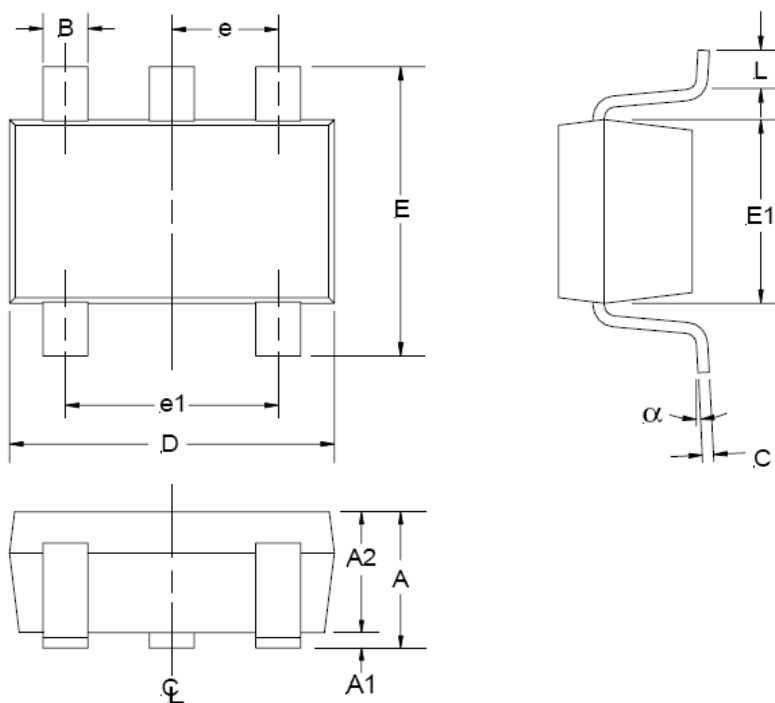
## Pin Definitions

| Pin | Name        | Description                                      |
|-----|-------------|--------------------------------------------------|
| 1   | <b>VOUT</b> | Output voltage and current                       |
| 2   | <b>COM</b>  | IC ground                                        |
| 3   | <b>VTH</b>  | Programmable upper VOUT turn-off threshold input |
| 4   | <b>ENN</b>  | Enable pin (high level disables IC)              |
| 5   | <b>VIN</b>  | High-voltage input                               |

## Pin Assignments



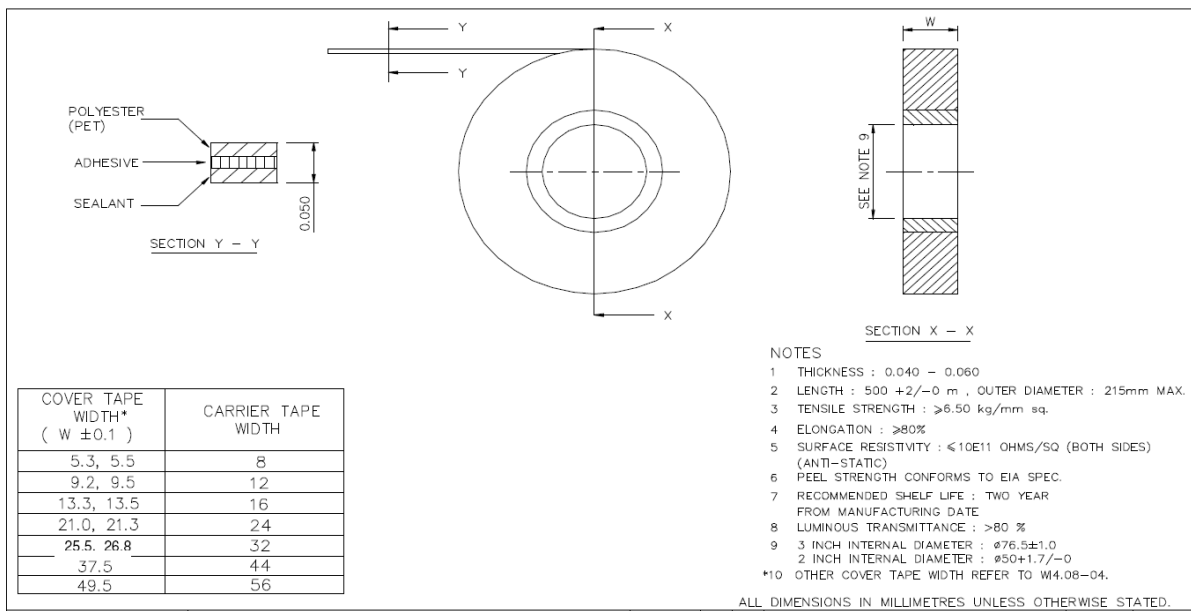
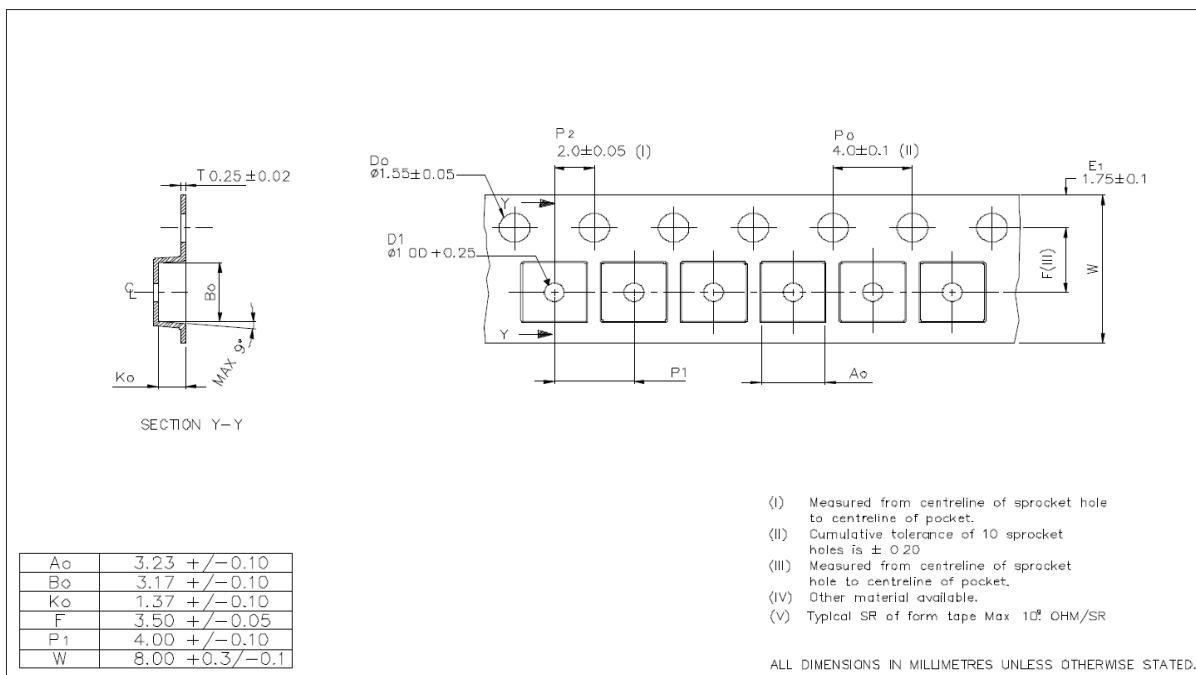
5-Lead SOT 23

**Package Details: 5-Pin SOT23**


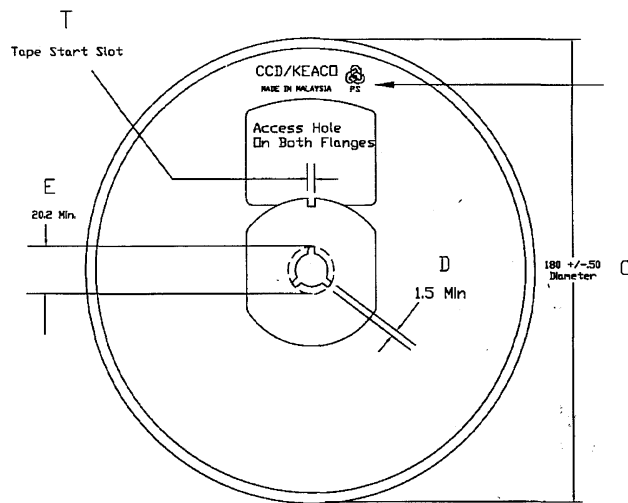
| SYMBOL   | MIN      | MAX  |
|----------|----------|------|
| A        | 0.90     | 1.45 |
| A1       | 0.00     | 0.15 |
| A2       | 0.90     | 1.30 |
| B        | 0.25     | 0.50 |
| C        | 0.09     | 0.20 |
| D        | 2.80     | 3.00 |
| E        | 2.60     | 3.00 |
| E1       | 1.50     | 1.75 |
| e        | 0.95 REF |      |
| e1       | 1.90 REF |      |
| L        | 0.35     | 0.55 |
| $\alpha$ | 0°       | 10°  |

NOTE: ALL MEASUREMENTS  
ARE IN MILLIMETERS.

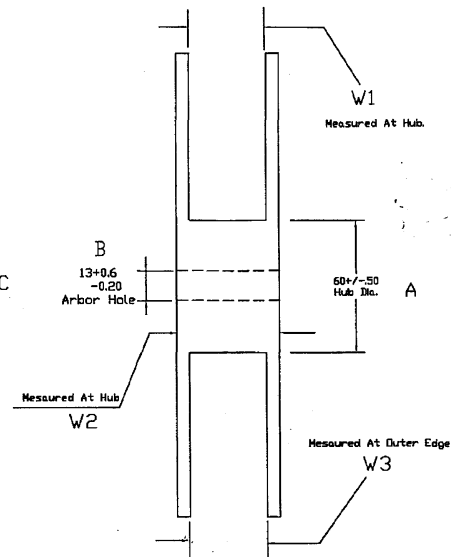
## Tape and Reel Details: 5-Pin SOT23



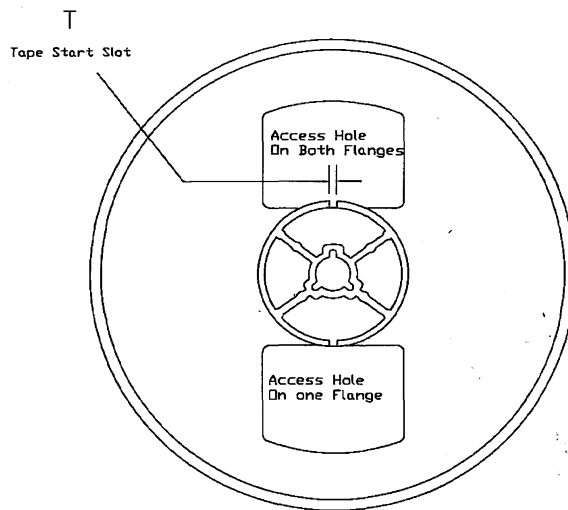
# Tape and Reel Details: 5-Pin SOT23



FRONT VIEW



SIDE VIEW

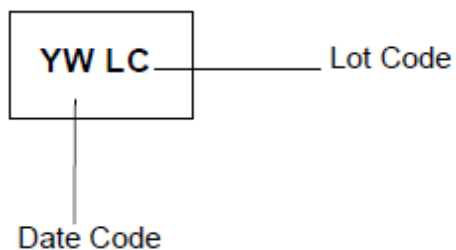


BACK VIEW

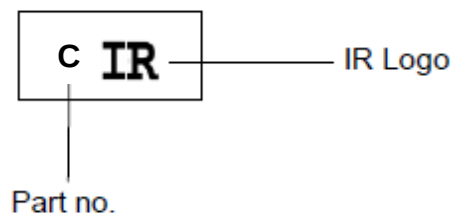
- NOTE:
1. MATERIAL : POLYSTYRENE
  2. SURFACE RESISTIVITY :  $\leq 10E11$  OHMS/SQ (EXTERNAL OR DIPPED)
  3. STATIC DECAY :  $< 2$  SEC. AT 50%RH

## Part Marking Information: 5-Pin SOT23

### Top Marking



### Bottom Marking



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