# μHVIC™ SOT-23 High-Side Gate Driver IC

## Features

- Floating gate driver designed for bootstrap operation
- Fully operational to +600 V
- Excellent dv/dt immunity
- Excellent negative $V_S$ transient immunity
- Wide $V_{CC}$ range
- UVLO on low-side and high-side
- Schmitt-trigger input with internal pull-down
- Output in phase with input
- Excellent latch immunity on all inputs & outputs
- RoHS compliant
- 6-pin SOT-23 package

## Applications

- High-side gate driver control
- Pulse transformer replacement
- General purpose switched mode power electronics

## Description

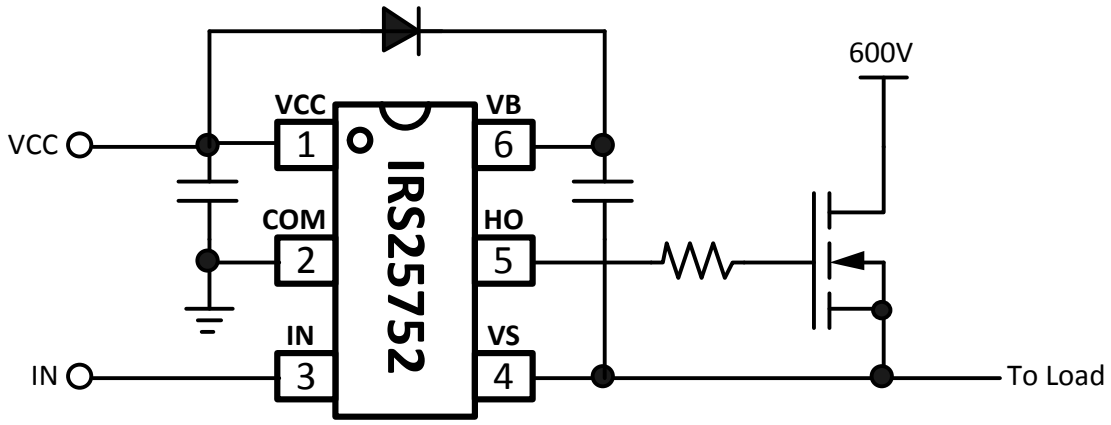
The IRS25752 is a high-side, single-channel gate driver IC with 600V blocking and level-shifting capability. This allows for the gate driver to be connected directly to the gate of a high-side power MOSFET, while being controlled by the low-side, ground potential circuitry. The IRS25752 includes a wide $V_{CC}$ supply range, UVLO protection, and excellent immunity to harsh dv/dt or $-V_S$ switching environments. IR's HVIC technology allows for these functions and features to be realized in a 6-pin SOT-23 package.

## Package Options



SOT23-6L

## Typical Connection Diagram




## Ordering Information

| Base Part Number | Package Type | Standard Pack | | Orderable Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| IRS25752LPBF | SOT-23-6L | Tape and Reel | 3000 | IRS25752LTRPBF |


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| Table of Contents | Page |
|---|---|
| Description | 1 |
| Ordering Information | 1 |
| Typical Connection Diagram | 1 |
| Absolute Maximum Ratings | 3 |
| Recommended Operating Conditions | 3 |
| Electrical Characteristics | 4 |
| Functional Block Diagram | 5 |
| Timing Diagram | 6 |
| Lead Definitions | 7 |
| Lead Assignments | 7 |
| Package Details: 6L-SOT23 | 9 |
| Tape and Reel Details: 6L-SOT23 | 10 |
| Part Marking Information | 12 |
| Qualification Information | 13 |

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## 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 |
|---|---|---|---|---|---|
| $V_B$ | High side floating absolute voltage | | -0.3 | 620 | V |
| $V_S$ | High side floating supply offset voltage | | $V_B$ - 20 | $V_B$ + 0.3 | |
| $V_{HO}$ | High side floating gate drive output voltage | | $V_S$ - 0.3 | $V_B$ + 0.3 | |
| $V_{CC}$ | Low side and logic fixed supply voltage | | -0.3 | 20 | |
| $V_{IN}$ | Logic input voltage | | COM - 0.3 | $V_{CC}$ + 0.3 | |
| COM | Logic ground | | $V_{CC}$ - 20 | $V_{CC}$ + 0.3 | |
| dVS/dt | High side floating supply offset voltage slew rate | | --- | 50 | V/ns |
| $R\Theta_{JA}$ | Thermal resistance, junction to ambient | 6L-SOT-23 | --- | 151 | ºC/W |
| $T_J$ | Junction temperature | | -55 | 150 | ºC |
| $T_S$ | Storage temperature | | | | |
| $T_L$ | IC Pin temperature (soldering, 10 seconds) | | --- | 300 | |

## Recommended Operating Conditions

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

| Symbol | Definition | Min | Max | Units |
|---|---|---|---|---|
| $V_B$ | High side floating absolute voltage | $V_S$ + 10 | $V_S$ + 18 | V |
| $V_S$ | High side floating supply offset voltage | COM - 8 † | 600 | |
| $V_{HO}$ | High side floating gate drive output voltage | $V_S$ | $V_B$ | |
| $V_{CC}$ | Low side and logic fixed supply voltage | 10 | 18 | |
| $V_{IN}$ | Logic input voltage | COM | $V_{CC}$ | |
| $T_J$ | Junction temperature | -40 | 125 | ºC |

† Logic operational for $V_S$ of -8V to +600V. Logic state held for $V_S$ of -8V to $-V_{BS}$.

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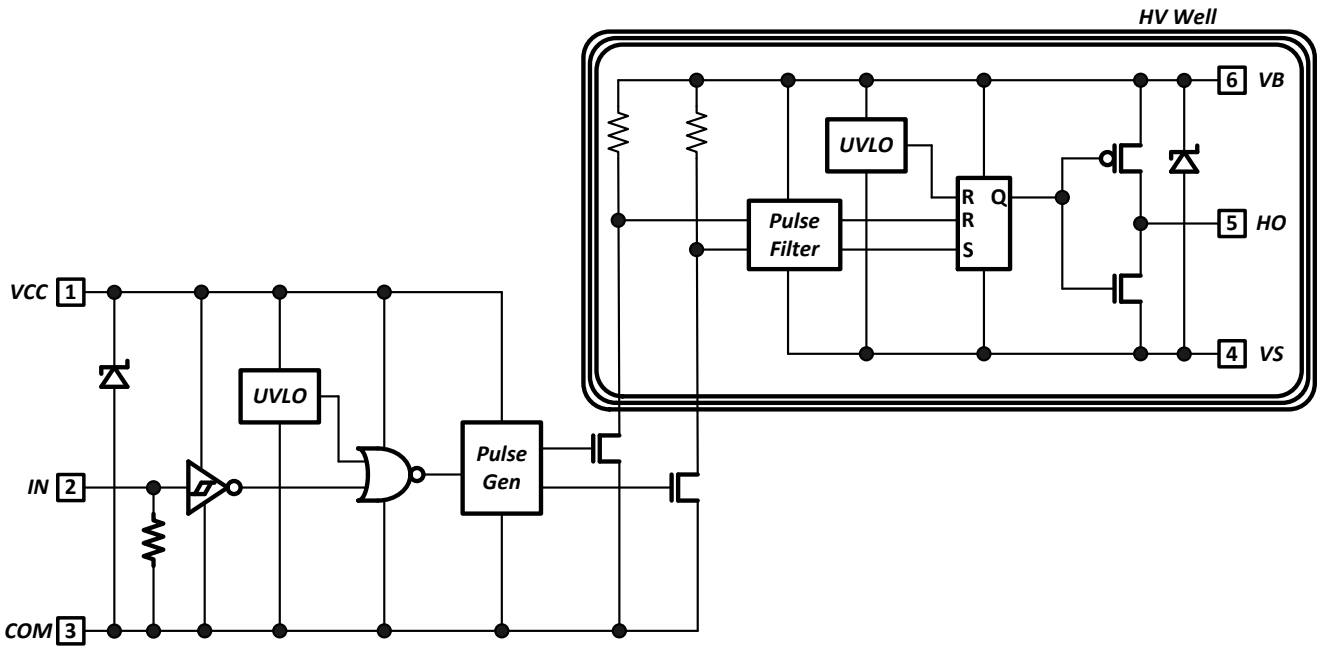
## Electrical Characteristics

$V_{CC}$=15V, $V_{BS}$=15V, $C_L$=1000pF, and $T_A$ = 25 °C unless otherwise specified.

| Symbol | Definition | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| **Low Side Characteristics** | | | | | | |
| $V_{CCUV+}$ | $V_{CC}$ supply UVLO positive-going | 8.0 | 9.0 | 10.0 | V | |
| $V_{CCUV-}$ | $V_{CC}$ supply UVLO negative-going | 7.0 | 8.0 | 9.0 | | |
| $I_{QCC}$ | Quiescent $V_{CC}$ supply current | --- | 100 | --- | µA | |
| $V_{CC_CLAMP}$ | $V_{CC}$ internal Zener clamp voltage | --- | 20.4 | --- | V | $I_{CC}$ = 5mA |
| $V_{IH}$ | Logic “1” input voltage | --- | --- | 2.2 | | |
| $V_{IL}$ | Logic “0” input voltage | 0.8 | --- | --- | | |
| $I_{IN+}$ | Logic “1” input bias current | --- | 20 | 40 | µA | $V_{IN}$ = $V_{CC}$ |
| $I_{IN-}$ | Logic “0” input bias current | --- | --- | 5 | | $V_{IN}$ = COM |
| **High Side Characteristics** | | | | | | |
| $V_{BSUV+}$ | $V_{BS}$ supply UVLO positive-going | 8.0 | 9.0 | 10.0 | V | |
| $V_{BSUV-}$ | $V_{BS}$ supply UVLO negative-going | 7.0 | 8.0 | 9.0 | | |
| $V_{BS_CLAMP}$ | $V_{BS}$ internal Zener clamp voltage | --- | 20.4 | --- | | $I_{BS}$ = 5mA |
| $V_{OH}$ | High level output voltage ($V_B$ – HO) | --- | 0.8 | 1.4 | | $I_O$ = 2mA |
| $V_{OL}$ | Low level output voltage (HO – $V_S$) | --- | 0.3 | 0.6 | | |
| $I_{LK}$ | Offset supply leakage current | --- | --- | 50 | µA | $V_B$ = $V_S$ = 600V |
| $I_{QBS}$ | Quiescent $V_{BS}$ supply current | --- | 80 | --- | | $V_{IN}$ = $V_{CC}$ or COM |
| **Gate Drive Characteristics** | | | | | | |
| $t_{ON}$ | Turn-on propagation delay | --- | 140 | --- | ns | $V_S$ = 0V |
| $t_{OFF}$ | Turn-off propagation delay | --- | 215 | --- | | $V_S$ = 600V |
| $t_{RISE}$ | Turn-on rise time | --- | 85 | --- | | $V_S$ = 0V |
| $t_{FALL}$ | Turn-off fall time | --- | 40 | --- | | |
| $I_{O+}$ | HO gate drive output source current | --- | 160 | --- | mA | |
| $I_{O-}$ | HO gate drive output sink current | --- | 240 | --- | | |

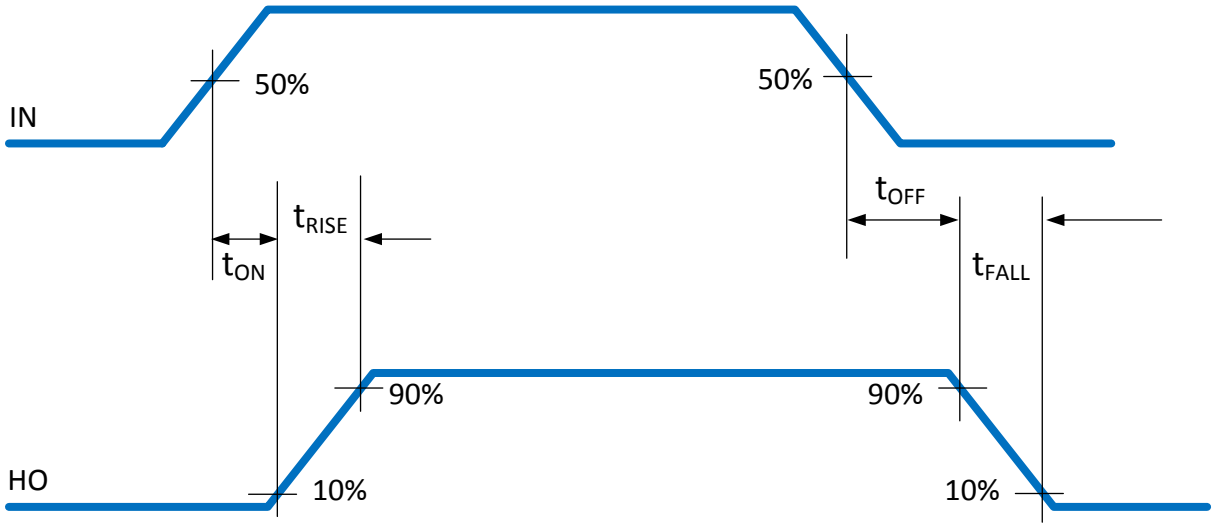
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## Functional Block Diagram




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## Timing Diagram

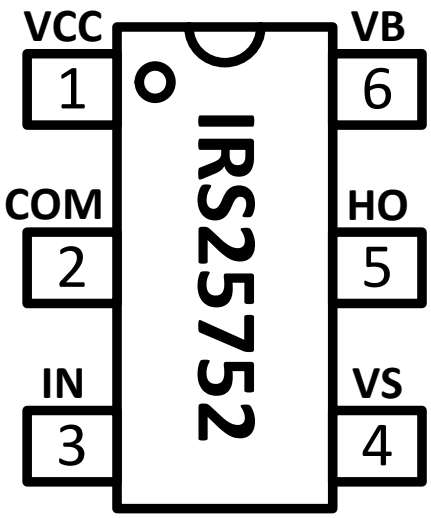



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## Pin Definitions

| Pin | Symbol | Description |
|---|---|---|
| 1 | VCC | IC supply voltage |
| 2 | COM | IC power and signal ground |
| 3 | IN | Logic input |
| 4 | VS | High side floating supply offset voltage |
| 5 | HO | High side gate driver output |
| 6 | VB | High side floating supply voltage |

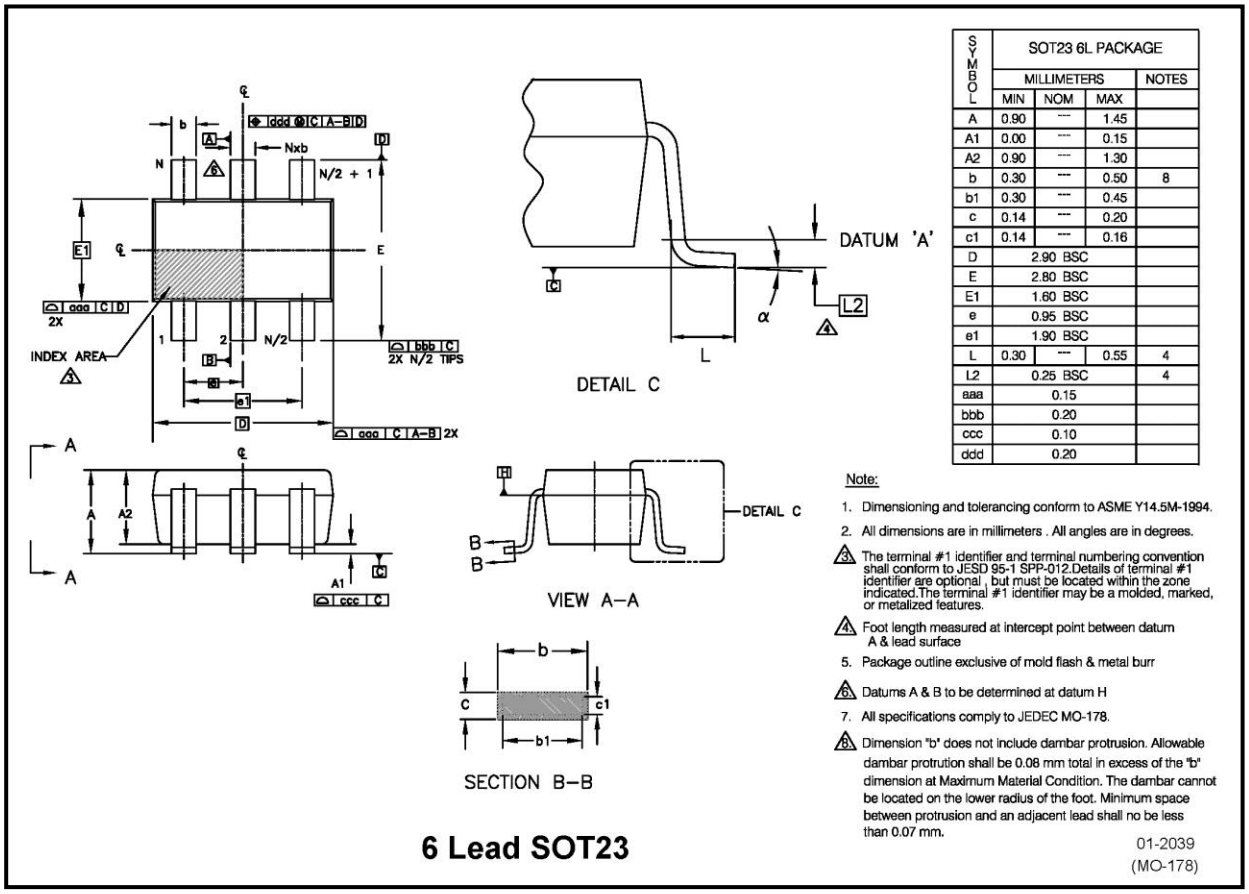
## Pin Assignments




**6-Lead SOT 23**

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## Package Details: 6L-SOT23



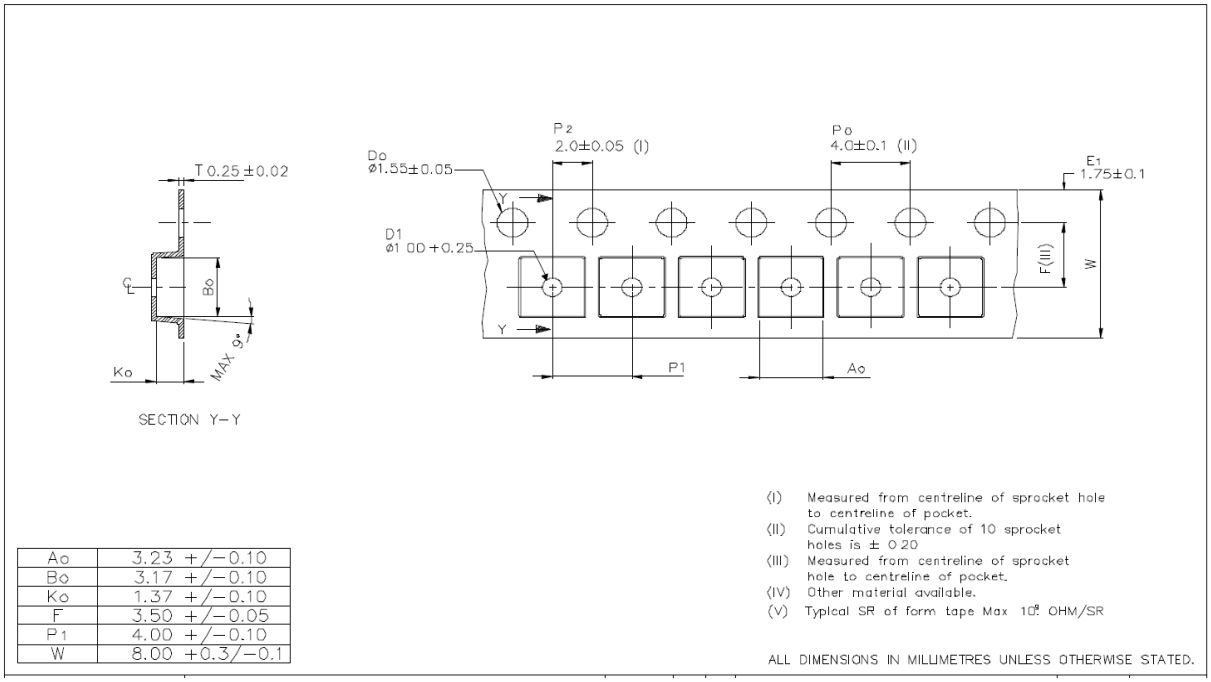

| SYMBOL | SOT23 6L PACKAGE | | | |
|---|---|---|---|---|
| | MILLIMETERS | | | NOTES |
| | MIN | NOM | MAX | |
| A | 0.90 | --- | 1.45 | |
| A1 | 0.00 | --- | 0.15 | |
| A2 | 0.90 | --- | 1.30 | |
| b | 0.30 | --- | 0.50 | 8 |
| b1 | 0.30 | --- | 0.45 | |
| c | 0.14 | --- | 0.20 | |
| c1 | 0.14 | --- | 0.16 | |
| D | 2.90 BSC | | | |
| E | 2.80 BSC | | | |
| E1 | 1.60 BSC | | | |
| e | 0.95 BSC | | | |
| e1 | 1.90 BSC | | | |
| L | 0.30 | --- | 0.55 | 4 |
| L2 | 0.25 BSC | | | 4 |
| aaa | 0.15 | | | |
| bbb | 0.20 | | | |
| ccc | 0.10 | | | |
| ddd | 0.20 | | | |

Note:

1. Dimensioning and tolerancing conform to ASME Y14.5M-1994.
2. All dimensions are in millimeters . All angles are in degrees.
3. The terminal #1 identifier and terminal numbering convention shall conform to JESD 95-1 SPP-012.Details of terminal #1 identifier are optional , but must be located within the zone indicated.The terminal #1 identifier may be a molded, marked, or metalized features.
4. Foot length measured at intercept point between datum A & lead surface
5. Package outline exclusive of mold flash & metal burr
6. Datums A & B to be determined at datum H
7. All specifications comply to JEDEC MO-178.
8. Dimension "b" does not include dambar protrusion. Allowable dambar protrution shall be 0.08 mm total in excess of the "b" dimension at Maximum Material Condition. The dambar cannot be located on the lower radius of the foot. Minimum space between protrusion and an adjacent lead shall no be less than 0.07 mm.

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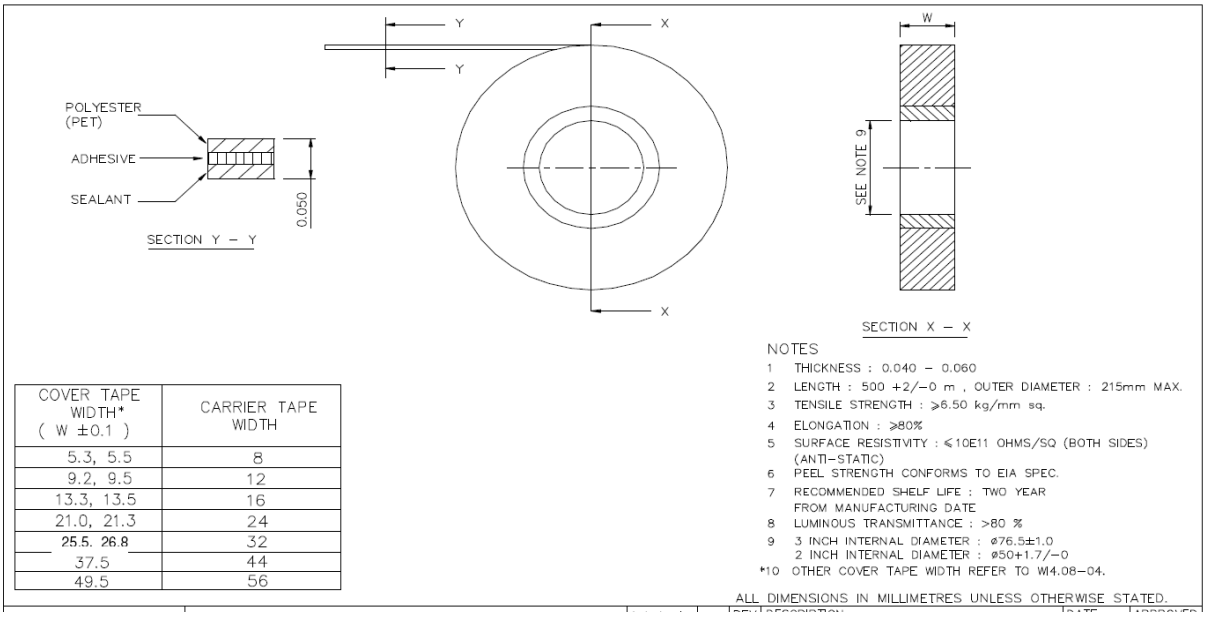
## Tape and Reel Details: 6L-SOT23




| | |
|---|---|
| Ao | 3.23 +/−0.10 |
| Bo | 3.17 +/−0.10 |
| Ko | 1.37 +/−0.10 |
| F | 3.50 +/−0.05 |
| P1 | 4.00 +/−0.10 |
| W | 8.00 +0.3/−0.1 |

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.
(V) Typical SR of form tape Max $10^{9}$ OHM/SR

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



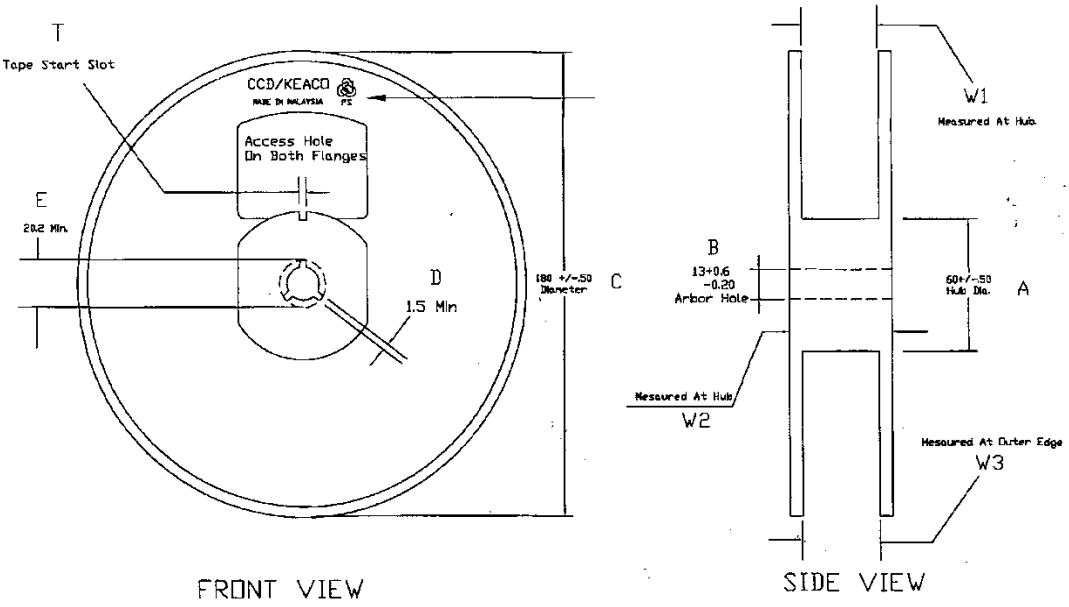

| COVER TAPE WIDTH* ( W ±0.1 ) | CARRIER TAPE WIDTH |
|---|---|
| 5.3, 5.5 | 8 |
| 9.2, 9.5 | 12 |
| 13.3, 13.5 | 16 |
| 21.0, 21.3 | 24 |
| 25.5, 26.8 | 32 |
| 37.5 | 44 |
| 49.5 | 56 |

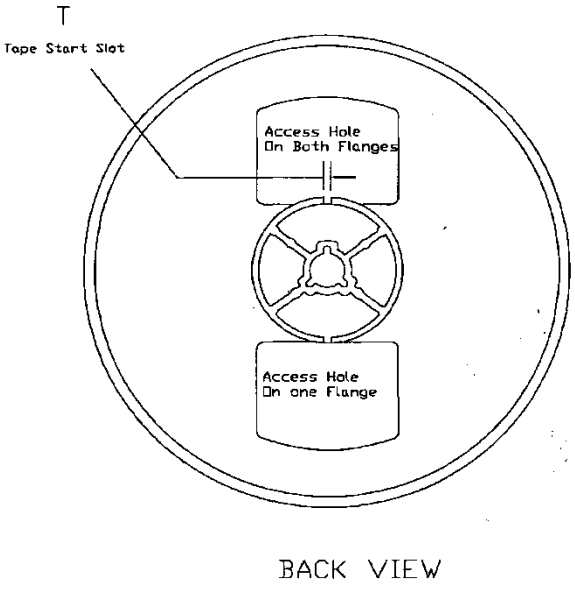
NOTES
1 THICKNESS : 0.040 – 0.060
2 LENGTH : 500 +2/−0 m , OUTER DIAMETER : 215mm MAX.
3 TENSILE STRENGTH : ≥6.50 kg/mm sq.
4 ELONGATION : ≥80%
5 SURFACE RESISTIVITY : ≤10E11 OHMS/SQ (BOTH SIDES) (ANTI–STATIC)
6 PEEL STRENGTH CONFORMS TO EIA SPEC.
7 RECOMMENDED SHELF LIFE : TWO YEAR FROM MANUFACTURING DATE
8 LUMINOUS TRANSMITTANCE : >80 %
9 3 INCH INTERNAL DIAMETER : ø76.5±1.0
2 INCH INTERNAL DIAMETER : ø50+1.7/−0
10 OTHER COVER TAPE WIDTH REFER TO W14.08–04.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

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## Tape and Reel Details: 6L-SOT23



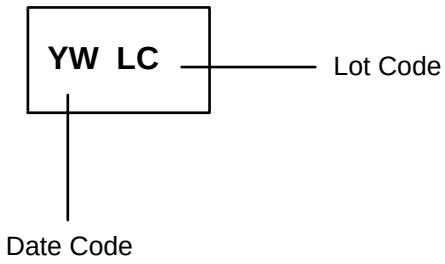




NOTE:
1. MATERIAL : POLYSTRENE
2. SURFACE RESISTIVITY : </= 10E11 OHMS/SQ
(EXTERNAL OR DIPPED)
3. STATIC DECAY : < 2SEC. AT 50%RH

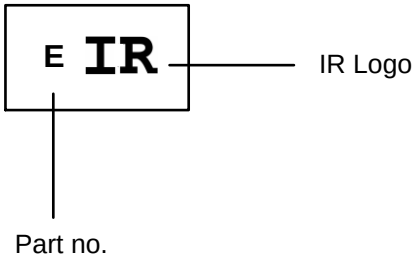
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## Part Marking Information: 6 Lead SOT23

### Top Marking




### Bottom Marking




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## Qualification Information†

| | | | |
|---|---|---|---|
| **Qualification Level** | | Industrial†† (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. | |
| **Moisture Sensitivity Level** | | SOT-23 | MSL1††† (per IPC/JEDEC J-STD-020C) |
| **ESD** | Machine Model | Class B (per JEDEC standard EIA/JESD22-A115-A) | |
| | Human Body Model | Class 1B (per EIA/JEDEC standard JESD22-A114-B) | |
| **IC Latch-Up Test** | | Class I, Level A (per JESD78A) | |
| **RoHS Compliant** | | 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.

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