

**RGB HIGH VOLTAGE VIDEO AMPLIFIER**

PRELIMINARY DATA

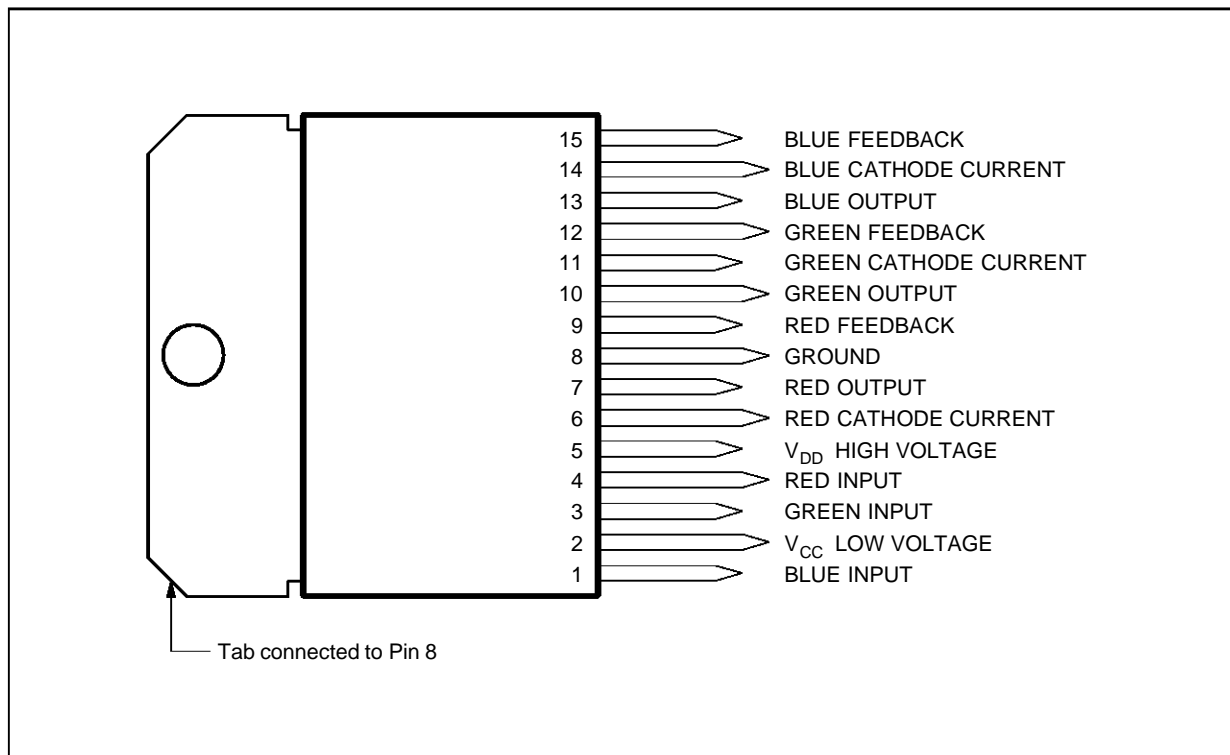
- BANDWIDTH : 10MHz TYPICAL
- RISE AND FALL TIME : 50ns TYPICAL
- CRT CATHODES CURRENT OUTPUTS FOR PARALLEL OR SEQUENTIAL CUT-OFF OR DRIVE ADJUSTMENT
- FLASHOVER PROTECTION
- POWER DISSIPATION : 3.5W
- ESD PROTECTED

**DESCRIPTION**

The TEA5101B includes three video amplifiers designed with a high voltage DMOS/bipolar technology. It drives directly the three CRT cathodes. The device is protected against flashovers. Due to its three cathode current outputs, the TEA5101B can be used with both parallel and sequential sampling applications.



**PIN CONNECTIONS (top view)**



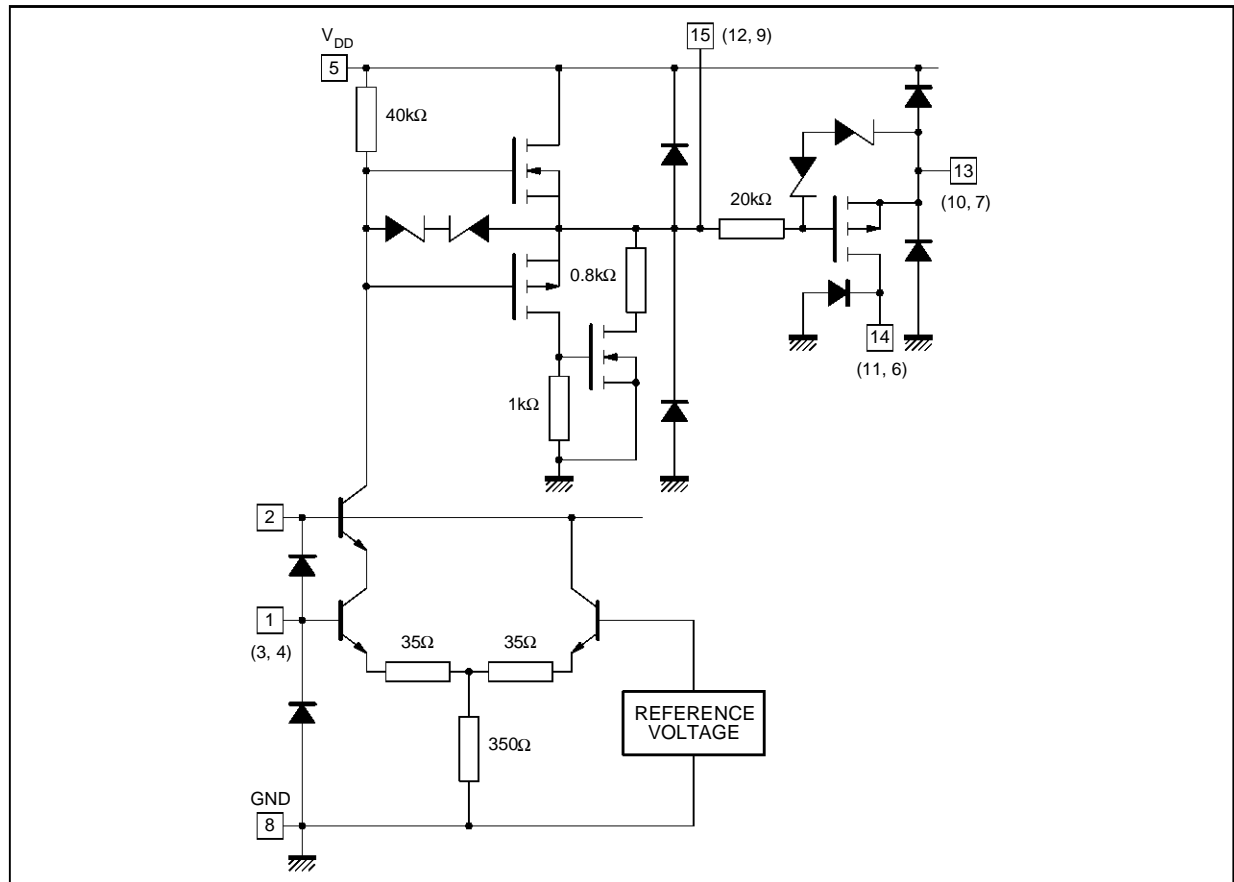
5101B-01.EPS

PIN FUNCTION

| N° | Function              | Description   |
|----|-----------------------|---|
| 1  | Blue Input            | Input of the "blue" amplifier. It is a virtual ground with 3.8V bias voltage, 15 microamperes input bias current with 14kΩ input resistance.  |
| 2  | V <sub>CC</sub>       | Low voltage power supply, typically 12V.  |
| 3  | Green Input           | See Pin 1.  |
| 4  | Red Input             | See Pin 1.  |
| 5  | V <sub>DD</sub>       | High voltage power supply, typically 200V.  |
| 6  | Red Cathode Current   | Provides the video processor with a copy of the DC current flowing into the red cathode, for automatic cut-off or gain adjustment. If this control is not used, Pin 6 must be grounded. |
| 7  | Red Output            | Output driving the red cathode. Pin 7 is internally protected against CRT arc discharges by a diode limiting the output voltage to V <sub>DD</sub> .                                    |
| 8  | Ground                | Also connected to the heatsink.   |
| 9  | Red Feedback          | Output driving the feedback resistor network for the red amplifier.   |
| 10 | Green Output          | See Pin 7.  |
| 11 | Green Cathode Current | See Pin 6.  |
| 12 | Green Feedback        | See Pin 9.  |
| 13 | Blue Output           | See Pin 7.  |
| 14 | Blue Cathode Current  | See Pin 6.  |
| 15 | Blue Feedback         | See Pin 9.  |

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BLOCK DIAGRAM OF EACH CHANNEL



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## ABSOLUTE MAXIMUM RATINGS

| Symbol                           | Parameter   | Value          | Unit     |
|----------------------------------|---|----------------|----------|
| V <sub>DD</sub>                  | Supply High Voltage<br>Pin 5  | 250            | V        |
| V <sub>CC</sub>                  | Supply Low Voltage<br>Pin 2   | 20             | V        |
| I <sub>O</sub><br>I <sub>O</sub> | Output Current<br>to V <sub>DD</sub><br>to Ground<br>Pins 7 - 10 - 13 | Protected<br>8 | mA       |
| I <sub>F</sub><br>I <sub>F</sub> | Output Current<br>to V <sub>DD</sub><br>to Ground<br>Pins 9 - 12 - 15 | 45<br>45       | mA<br>mA |
| I <sub>j</sub>                   | Input Current<br>Pins 1 - 3 - 4                                       | 60             | mA       |
| T <sub>j</sub>                   | Junction Temperature  | 150            | °C       |
| T <sub>oper</sub>                | Operating Ambient Temperature   | 0 to 70        | °C       |
| T <sub>stg</sub>                 | Storage Temperature   | - 55 to + 150  | °C       |

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## THERMAL DATA

| Symbol               | Parameter   | Value | Unit |
|----------------------|---|-------|------|
| R <sub>th(j-c)</sub> | Maximum Junction Case Thermal Resistance<br>Max.    | 3     | °C/W |
| R <sub>th(j-a)</sub> | Typical Junction Ambient Thermal Resistance<br>Typ. | 35    | °C/W |

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## ELECTRICAL CHARACTERISTICS

T<sub>amb</sub> = 25°C ; V<sub>CC</sub> = 12V ; V<sub>DD</sub> = 220V ; AV = 55 (unless otherwise specified)

| Symbol                          | Parameter   | Min. | Typ.    | Max. | Unit       |
|---------------------------------|---|------|---------|------|------------|
| V <sub>DD</sub>                 | High Supply Voltage<br>Pin 5  |      | 200     | 220  | V          |
| V <sub>CC</sub>                 | Low Supply Voltage<br>Pin 2   | 10   | 12      | 15   | V          |
| I <sub>DD</sub>                 | High Voltage Supply Internal DC Current (V <sub>out</sub> 100V)<br>(without the current due to the feedback network)<br>Pin 5   |      | 9.5     | 15   | mA         |
| I <sub>CC</sub>                 | Low Voltage Supply Internal DC Current  |      | 38      | 55   | mA         |
| V <sub>sath</sub>               | Output Saturation Voltage (High level)<br>I <sub>O</sub> = - 10 μA<br>Pins 7-10-13  |      | 3       | 10   | V          |
| R <sub>ON</sub>                 | Output Mos Transistor (Low level)<br>R <sub>ON</sub> @ I <sub>O</sub> = 3 mA<br>Pins 7-10-13  |      | 1.7     |      | kΩ         |
| BW                              | Bandwidth (- 3db) (measured on CRT cathodes)<br>(C <sub>LOAD</sub> : 10pF - R Protect = 1kΩ - V <sub>out</sub> = 100V)<br>Δ V <sub>out</sub> : 50 V <sub>PP</sub><br>Δ V <sub>out</sub> : 100 V <sub>PP</sub> |      | 10<br>8 |      | MHz<br>MHz |
| T <sub>R</sub> - T <sub>F</sub> | Rise Time and Fall Time : measured between 10% and 90% of output<br>pulse (C <sub>LOAD</sub> : 10 pF - R Protect = 1 kΩ - V <sub>out</sub> = 100 V)<br>Δ V <sub>out</sub> : 100 V <sub>PP</sub>               |      | 50      |      | ns         |
| G <sub>O</sub>                  | Open Loop Gain  | 47   | 53      |      | dB         |
|                                 | Open Loop Gain Difference between 2 channels  | -1.5 | 0       | +1.5 | dB         |
|                                 | Open Loop Gain Temperature Coefficient  |      | 0       |      | dB/°C      |
| P                               | Internal Power Dissipation (see calculation below)  |      | 3.5     |      | W          |
| V <sub>REF</sub>                | Internal Voltage Reference<br>Pins 1-3-4  | 3.55 | 3.85    | 4.15 | V          |
|                                 | Internal Reference Voltage Difference Between 2 Channels  |      |         | 250  | mV         |
|                                 | Voltage Reference Temperature Coefficient   |      | 0       |      | mV/°C      |
| I <sub>IB</sub>                 | Input Bias Current (V <sub>out</sub> : 100 V)<br>Pins 1-3-4   |      | 15      |      | μA         |
| R <sub>I</sub>                  | Input Resistance  |      | 14      |      | kΩ         |

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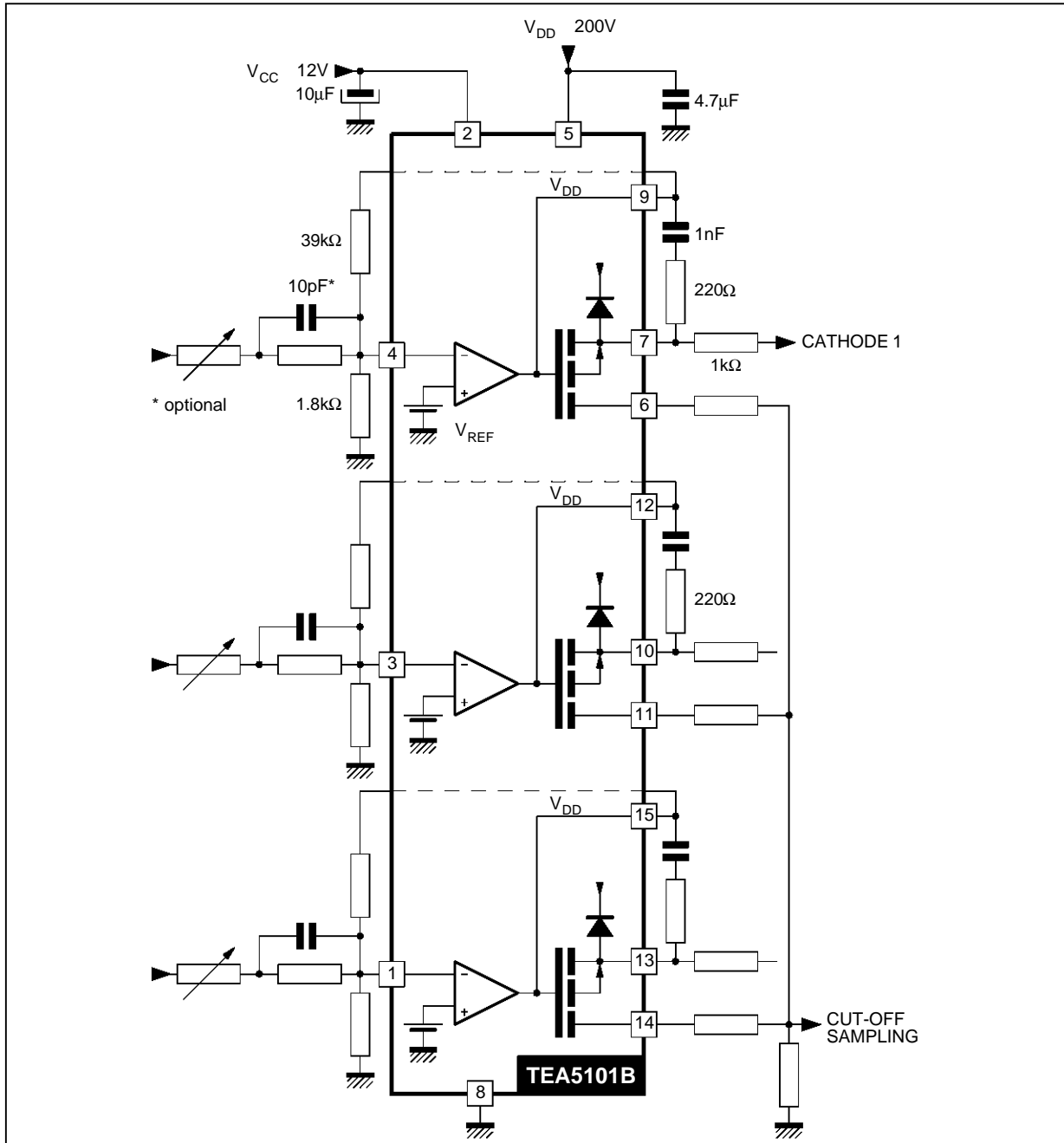
# TEA5101B

## TYPICAL APPLICATION

The TEA5101B consists of three independent amplifiers. Each of them includes :

- A differential amplifier, the gain of which is fixed by external feedback resistors,

- A voltage reference,
- A PMOS transistor providing a copy of the cathode current,
- A protection diode against CRT arc discharges.



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## APPLICATION INFORMATION

### PC BOARD LAYOUT

The best performances of the high voltage video amplifier will be obtained only with a carefully designed PC board. Output to input capacitances are of particular importance.

For a single amplifier, the input-output capacitance, in parallel with the relatively high feedback resistance, creates a pole in the closed-loop transfer function. A low parasitic capacitance (0.3pF) feedback resistor and HF isolated printed wires are necessary. Further more, capacitive coupling from the output of an amplifier toward the input of another one may induce excessive crosstalk.

### POWER DISSIPATION

The power dissipation consists of a static part and a dynamic part. The static dissipation varies with the output voltage. With  $V_{DD} = 200V$ ,  $P_{stat} = 2.6W$  typ (3.5W max) at  $V_{OUT} = 100V$ , 1.5W typ at 150V and 3W typ at 50V (with R feedback = 39k $\Omega$ ).

$V_{OUT}$  first value (100V) will be the reference.

The dynamic dissipation depends on the signal spectrum and the load capacitance.

- Dynamic power with a typical picture with 150  $V_{pp}$  modulation is typically 1W.
- For a sine wave, dynamic dissipation per amplifier is  $P_d = F \times C_l \times V_{opp} \times V_{dd} \times 0.8$ .

The load capacitance  $C_L$  includes CRT and board capacitance (10pF), and amplifier output capacitance (8pF) : total  $C_L$  value is about 20pF. For a 5MHZ, 50  $V_{pp}$  sine wave and a 20pF load capacitance, the maximum dynamic power is 2.5W.

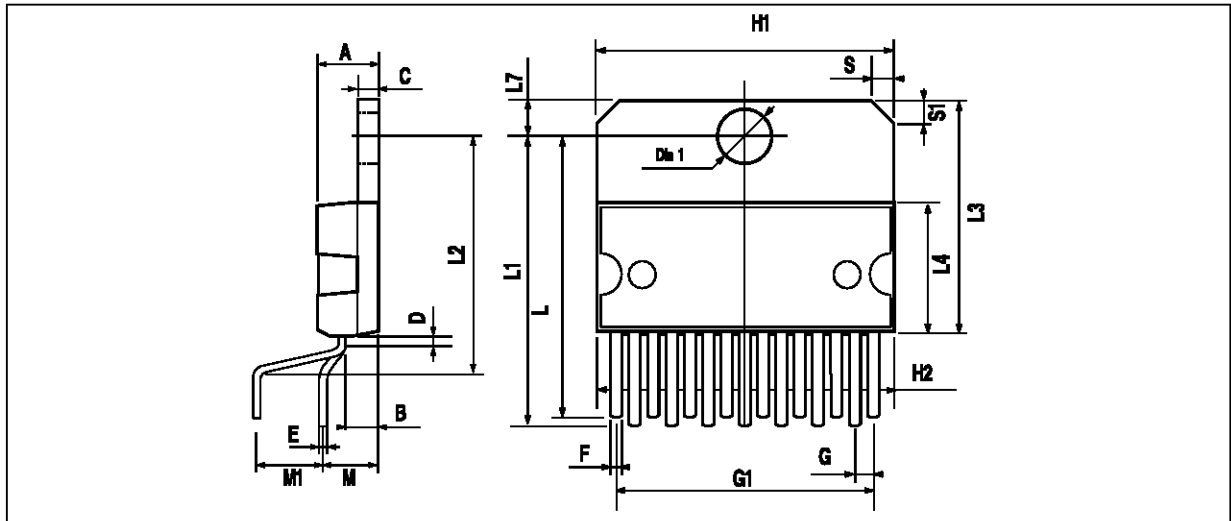
- Generally, the maximum dynamic power is reached with a white noise (tuner noise).
- Typical value is about 2W.

Total dissipation is typically 3.6W (2.6W + 1W). With a maximum static dissipation of 3.5W, total dissipation is :

- 4.5W with a typical picture (UER pattern)
- 5.5W with white noise

**TEA5101B**

**PACKAGE MECHANICAL DATA : 15 PINS – PLASTIC MULTIWATT**



PM/MW15V/EP5

| Dimensions | Millimeters |       |       | Inches |       |       |
|------------|-------------|-------|-------|--------|-------|-------|
|            | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A          |             |       | 5     |        |       | 0.197 |
| B          |             |       | 2.65  |        |       | 0.104 |
| C          |             |       | 1.6   |        |       | 0.063 |
| D          |             | 1     |       |        | 0.039 |       |
| E          | 0.49        |       | 0.55  | 0.019  |       | 0.022 |
| F          | 0.66        |       | 0.75  | 0.026  |       | 0.030 |
| G          | 1.02        | 1.27  | 1.52  | 0.040  | 0.050 | 0.060 |
| G1         | 17.53       | 17.78 | 18.03 | 0.690  | 0.700 | 0.710 |
| H1         | 19.6        |       |       | 0.772  |       |       |
| H2         |             |       | 20.2  |        |       | 0.795 |
| L          | 21.9        | 22.2  | 22.5  | 0.862  | 0.874 | 0.886 |
| L1         | 21.7        | 22.1  | 22.5  | 0.854  | 0.870 | 0.886 |
| L2         | 17.65       |       | 18.1  | 0.695  |       | 0.713 |
| L3         | 17.25       | 17.5  | 17.75 | 0.679  | 0.689 | 0.699 |
| L4         | 10.3        | 10.7  | 10.9  | 0.406  | 0.421 | 0.429 |
| L7         | 2.65        |       | 2.9   | 0.104  |       | 0.114 |
| M          | 4.25        | 4.55  | 4.85  | 0.167  | 0.179 | 0.191 |
| M1         | 4.63        | 5.08  | 5.53  | 0.182  | 0.200 | 0.218 |
| S          | 1.9         |       | 2.6   | 0.075  |       | 0.102 |
| S1         | 1.9         |       | 2.6   | 0.075  |       | 0.102 |
| Dia. 1     | 3.65        |       | 3.85  | 0.144  |       | 0.152 |

MW15V/TBL

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