



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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Description

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of automotive applications.

Features

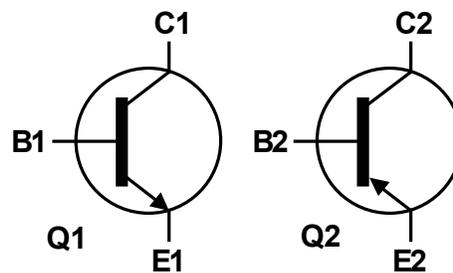
- Epitaxial Planar Die Construction
- Complementary Pair
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface Mount Package

Mechanical Data

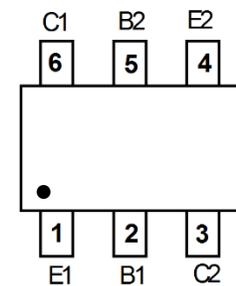
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Finish. Solderable per MIL-STD-202, Method 208 
- Weight: 0.006 grams (Approximate)



Top View



Device Symbol



Top View
Pin-Out

Absolute Maximum Ratings – NPN (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | 180 | V |
| Collector-Emitter Voltage | V_{CEO} | 160 | V |
| Emitter-Base Voltage | V_{EBO} | 6 | V |
| Continuous Collector Current | I_C | 200 | mA |

Absolute Maximum Ratings – PNP (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

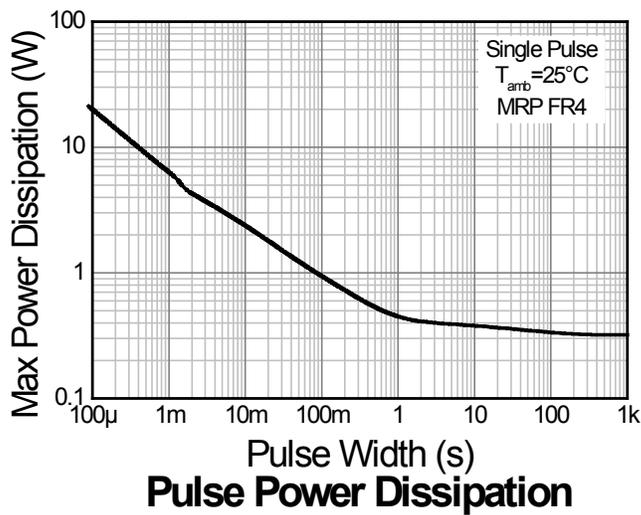
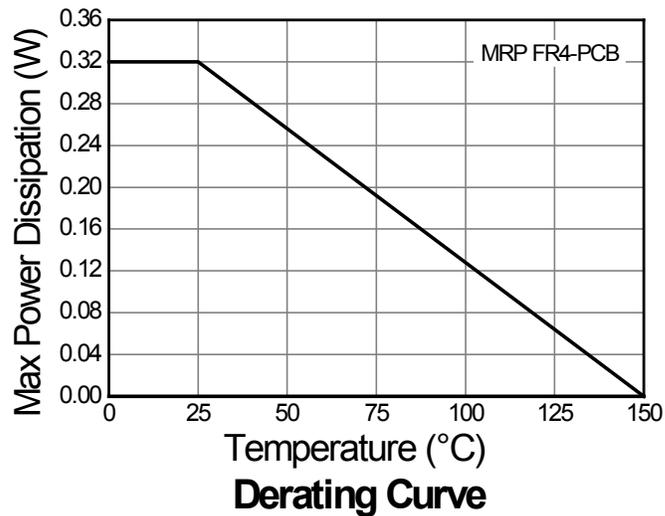
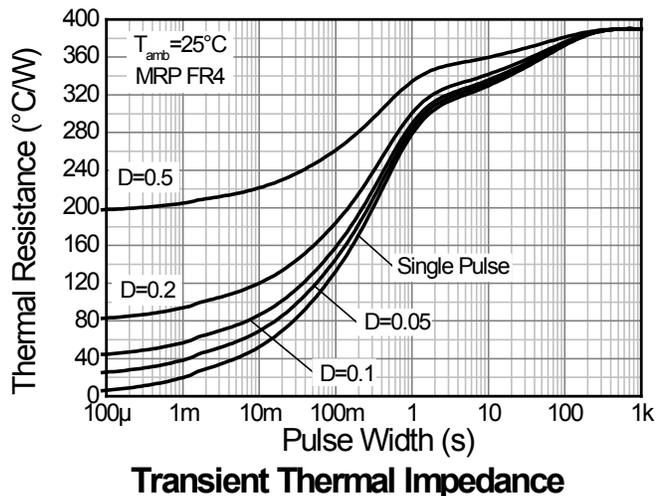
| Characteristic | Symbol | Value | Unit |
|------------------------------|-----------|-------|------|
| Collector-Base Voltage | V_{CBO} | -160 | V |
| Collector-Emitter Voltage | V_{CEO} | -150 | V |
| Emitter-Base Voltage | V_{EBO} | -6 | V |
| Continuous Collector Current | I_C | -200 | mA |

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|--------------------|
| Power Dissipation | P_D | (Note 5) | 200 |
| | | (Note 6, 7) | 320 |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | (Note 5) | 625 |
| | | (Note 6, 7) | 390 |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 140 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | |

- Notes:
5. For a device mounted on minimum recommended pad layout 1oz weight copper that is on a single-sided FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5, except the device uses 2oz copper.
 7. Maximum combined dissipation.
 8. Thermal resistance from junction to the top of package.

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Electrical Characteristics – NPN (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

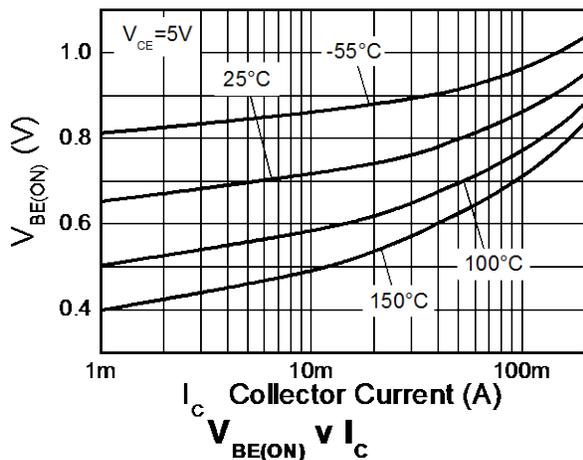
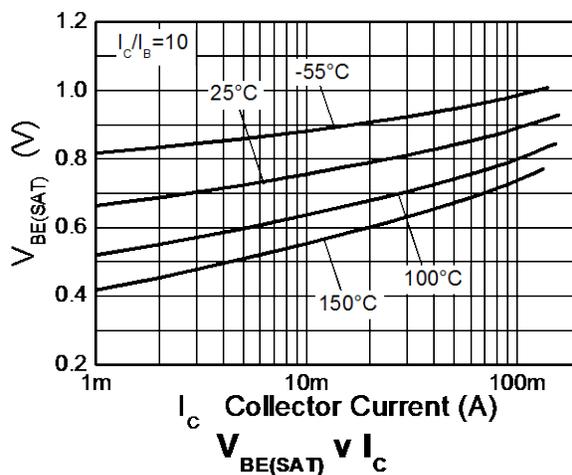
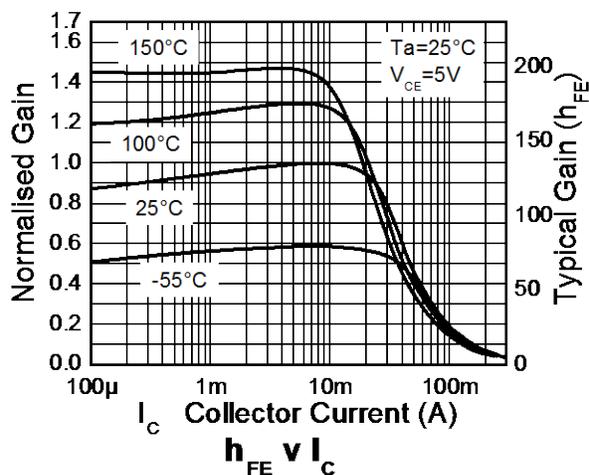
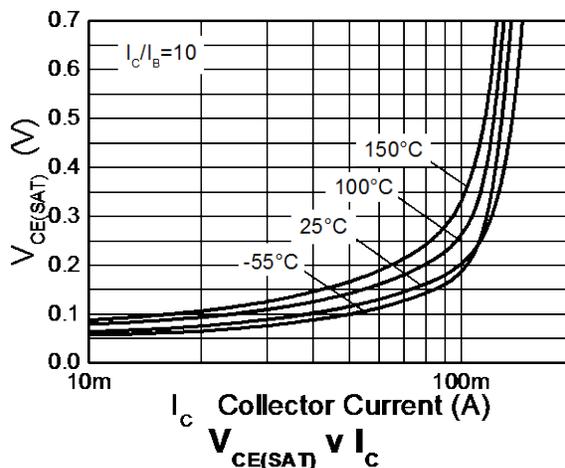
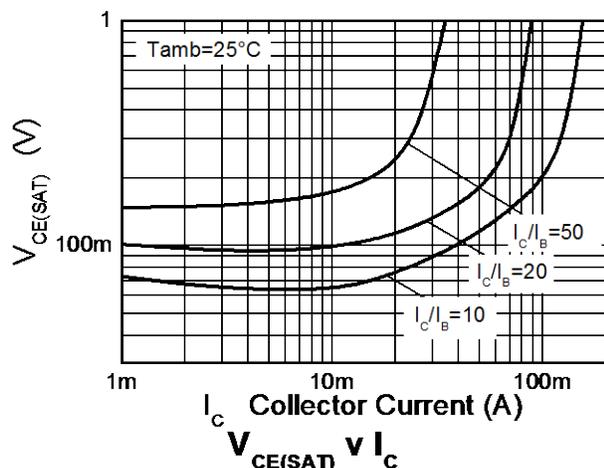
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------|-----|-----|------|---------------|---|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | BV_{CBO} | 180 | — | — | V | $I_C = 100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV_{CEO} | 160 | — | — | V | $I_C = 1\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | 6 | — | — | V | $I_E = 10\mu\text{A}, I_C = 0$ |
| Collector-Base Cutoff Current | I_{CBO} | — | — | 50 | nA | $V_{CB} = 120\text{V}, I_E = 0$ |
| | | — | — | 50 | μA | $V_{CB} = 120\text{V}, I_E = 0, T_A = +100^\circ\text{C}$ |
| Base-Emitter Cutoff Current | I_{EBO} | — | — | 50 | nA | $V_{EB} = 4\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| DC Current Gain | h_{FE} | 80 | — | — | — | $I_C = 1.0\text{mA}, V_{CE} = 5.0\text{V}$ |
| | | 80 | — | 250 | — | $I_C = 10\text{mA}, V_{CE} = 5.0\text{V}$ |
| | | 30 | — | — | — | $I_C = 50\text{mA}, V_{CE} = 5.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | 0.15 | V | $I_C = 10\text{mA}, I_B = 1.0\text{mA}$ |
| | | — | — | 0.20 | | $I_C = 50\text{mA}, I_B = 5.0\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | — | — | 1.0 | V | $I_C = 10\text{mA}, I_B = 1.0\text{mA}$ |
| | | — | — | — | | $I_C = 50\text{mA}, I_B = 5.0\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| Output Capacitance | C_{obo} | — | — | 6.0 | pF | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Small Signal Current Gain | h_{fe} | 50 | — | 250 | — | $I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1.0\text{MHz}$ |
| Current Gain-Bandwidth Product | f_T | 100 | — | 300 | MHz | $I_C = 10\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}$ |

Electrical Characteristics – PNP (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

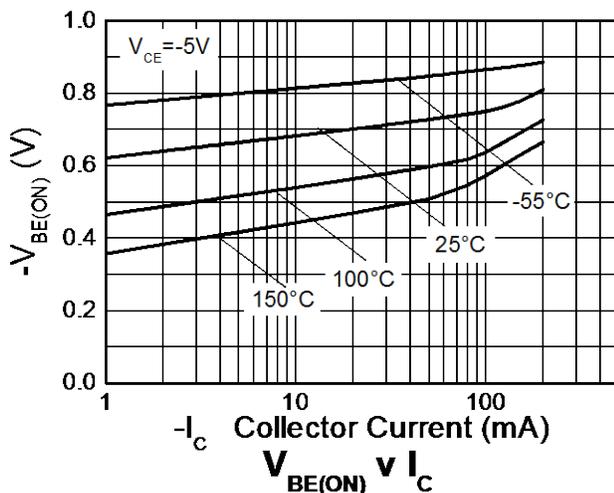
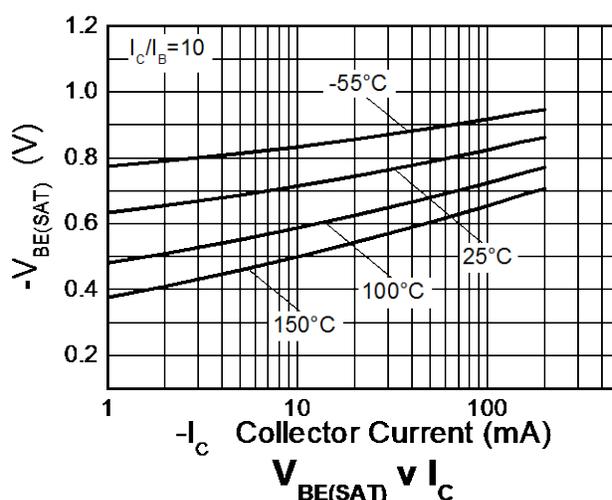
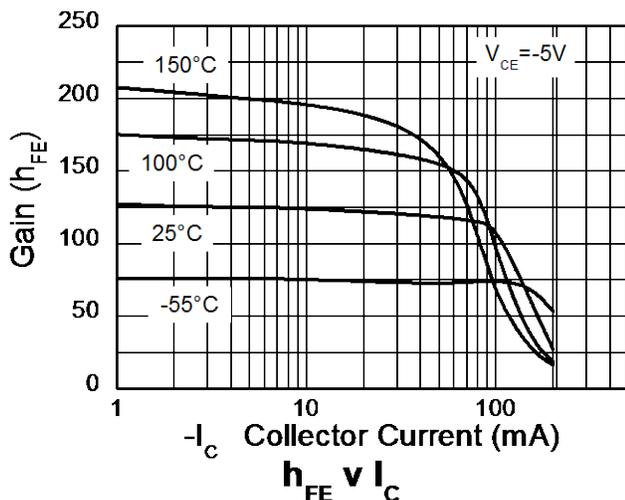
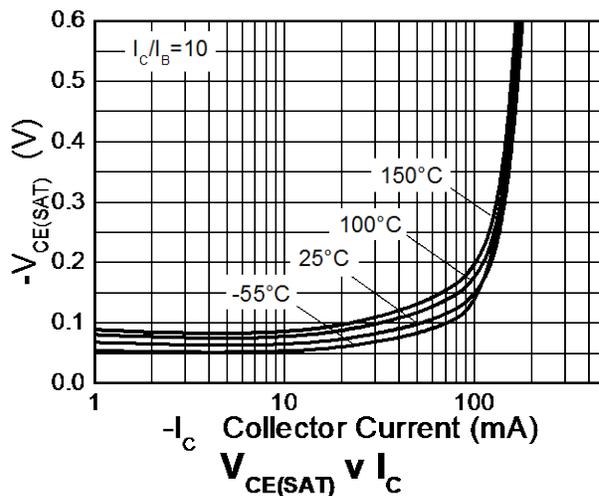
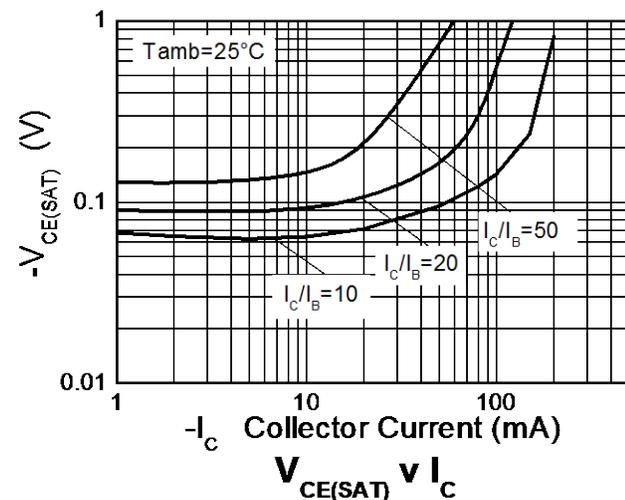
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------|------|-----|-------|---------------|---|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | BV_{CBO} | -160 | — | — | V | $I_C = -100\mu\text{A}, I_E = 0$ |
| Collector-Emitter Breakdown Voltage (Note 9) | BV_{CEO} | -150 | — | — | V | $I_C = -1\text{mA}, I_B = 0$ |
| Emitter-Base Breakdown Voltage | BV_{EBO} | -6 | — | — | V | $I_E = -10\mu\text{A}, I_C = 0$ |
| Collector-Base Cutoff Current | I_{CBO} | — | — | -50 | nA | $V_{CB} = -120\text{V}, I_E = 0$ |
| | | — | — | -50 | μA | $V_{CB} = -120\text{V}, I_E = 0, T_A = +100^\circ\text{C}$ |
| Base-Emitter Cutoff Current | I_{EBO} | — | — | -50 | nA | $V_{EB} = -4\text{V}, I_C = 0$ |
| ON CHARACTERISTICS (Note 9) | | | | | | |
| DC Current Gain | h_{FE} | 50 | — | — | — | $I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$ |
| | | 60 | — | 240 | — | $I_C = -10\text{mA}, V_{CE} = -5.0\text{V}$ |
| | | 50 | — | — | — | $I_C = -50\text{mA}, V_{CE} = -5.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | — | — | -0.20 | V | $I_C = -10\text{mA}, I_B = -1.0\text{mA}$ |
| | | — | — | -0.50 | | $I_C = -50\text{mA}, I_B = -5.0\text{mA}$ |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | — | — | -1.0 | V | $I_C = -10\text{mA}, I_B = -1.0\text{mA}$ |
| | | — | — | — | | $I_C = -50\text{mA}, I_B = -5.0\text{mA}$ |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| Output Capacitance | C_{obo} | — | — | 6.0 | pF | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}, I_E = 0$ |
| Small Signal Current Gain | h_{fe} | 40 | — | 260 | — | $I_C = -1\text{mA}, V_{CE} = -10\text{V}, f = 1.0\text{MHz}$ |
| Current Gain-Bandwidth Product | f_T | 100 | — | 300 | MHz | $I_C = -10\text{mA}, V_{CE} = -10\text{V}, f = 100\text{MHz}$ |

 Note: 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

Typical Electrical Characteristics – NPN (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

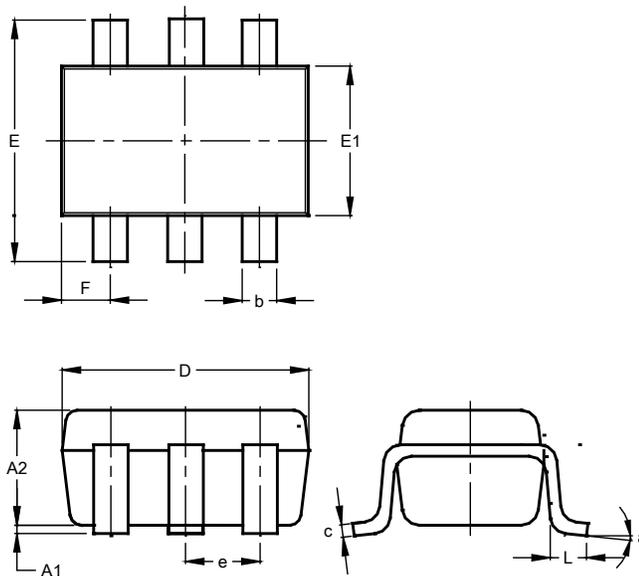


Typical Electrical Characteristics – PNP 5401 Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Package Outline Dimensions

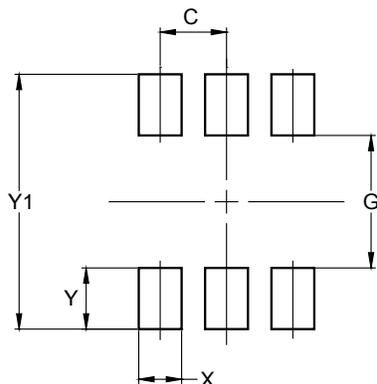
SOT363



| SOT363 | | | |
|----------------------|-----------|------|-------|
| Dim | Min | Max | Typ |
| A1 | 0.00 | 0.10 | 0.05 |
| A2 | 0.90 | 1.00 | 1.00 |
| b | 0.10 | 0.30 | 0.25 |
| c | 0.10 | 0.22 | 0.11 |
| D | 1.80 | 2.20 | 2.15 |
| E | 2.00 | 2.20 | 2.10 |
| E1 | 1.15 | 1.35 | 1.30 |
| e | 0.650 BSC | | |
| F | 0.40 | 0.45 | 0.425 |
| L | 0.25 | 0.40 | 0.30 |
| a | 0° | 8° | -- |
| All Dimensions in mm | | | |

Suggested Pad Layout

SOT363



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.650 |
| G | 1.300 |
| X | 0.420 |
| Y | 0.600 |
| Y1 | 2.500 |