

MMBT8099LT1

Preferred Device

Amplifier Transistor

NPN Silicon

Features

- Pb-Free Package is Available

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector-Emitter Voltage | V_{CEO} | 80 | Vdc |
| Collector-Base Voltage | V_{CBO} | 80 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 6.0 | Vdc |
| Collector Current – Continuous | I_C | 500 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 2.4 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

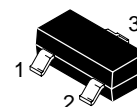
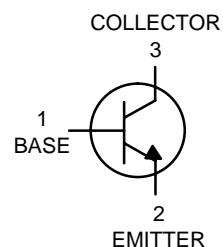
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

- FR-5 = 1.0 X 0.75 X 0.062 in.
- Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.



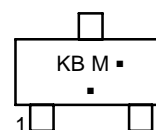
ON Semiconductor®

<http://onsemi.com>



SOT-23 (TO-236)
CASE 318
STYLE 6

MARKING DIAGRAM



KB = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------|---------------------|------------------|
| MMBT8099LT1 | SOT-23 | 3000/Tape & Reel |
| MMBT8099LT1G | SOT-23 (Pb-Free) | 3000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

Preferred devices are recommended choices for future use and best overall value.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|----------------------|--------|----------|------------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Breakdown Voltage (Note 3) (I _C = 10 mA _{dc} , I _B = 0) | V _{(BR)CEO} | 80 | – | V _{dc} |
| Collector–Base Breakdown Voltage (I _C = 100 μA _{dc} , I _E = 0) | V _{(BR)CBO} | 80 | – | V _{dc} |
| Emitter–Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0) | V _{(BR)EBO} | 6.0 | – | V _{dc} |
| Collector Cutoff Current (V _{CE} = 60 V _{dc} , I _B = 0) | I _{CES} | – | 0.1 | μA _{dc} |
| Collector Cutoff Current (V _{CB} = 60 V _{dc} , I _E = 0) (V _{CB} = 80 V _{dc} , I _E = 0) | I _{CBO} | – – | 0.1 – | μA _{dc} |
| Emitter Cutoff Current (V _{EB} = 6.0 V _{dc} , I _C = 0) (V _{EB} = 4.0 V _{dc} , I _C = 0) | I _{EBO} | – – | 0.1 – | μA _{dc} |

ON CHARACTERISTICS (Note 3)

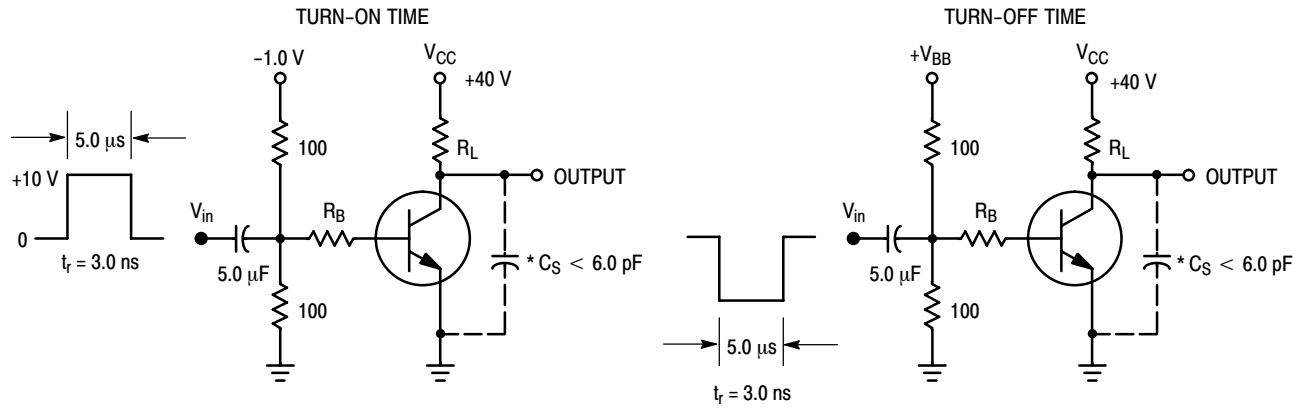
| | | | | |
|--|----------------------|------------------|---------------|-----------------|
| DC Current Gain (I _C = 1.0 mA _{dc} , V _{CE} = 5.0 V _{dc}) (I _C = 10 mA _{dc} , V _{CE} = 5.0 V _{dc}) (I _C = 100 mA _{dc} , V _{CE} = 5.0 V _{dc}) | h _{FE} | 100 100 75 | 300 – – | – |
| Collector–Emitter Saturation Voltage (I _C = 100 mA _{dc} , I _B = 5.0 mA _{dc}) (I _C = 100 mA _{dc} , I _B = 10 mA _{dc}) | V _{CE(sat)} | – – | 0.4 0.3 | V _{dc} |
| Base–Emitter On Voltage (I _C = 1.0 mA _{dc} , V _{CE} = 5.0 V _{dc}) (I _C = 10 mA _{dc} , V _{CE} = 5.0 V _{dc}) | V _{BE(on)} | – 0.6 | – 0.8 | V _{dc} |

SMALL–SIGNAL CHARACTERISTICS

| | | | | |
|--|------------------|-----|-----|-----|
| Current–Gain – Bandwidth Product (I _C = 10 mA _{dc} , V _{CE} = 5.0 V _{dc} , f = 100 MHz) | f _T | 150 | – | MHz |
| Output Capacitance (V _{CB} = 5.0 V _{dc} , I _E = 0, f = 1.0 MHz) | C _{obo} | – | 6.0 | pF |
| Input Capacitance (V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz) | C _{ibo} | – | 25 | pF |

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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*Total Shunt Capacitance of Test Jig and Connectors
For PNP Test Circuits, Reverse All Voltage Polarities

Figure 1. Switching Time Test Circuits

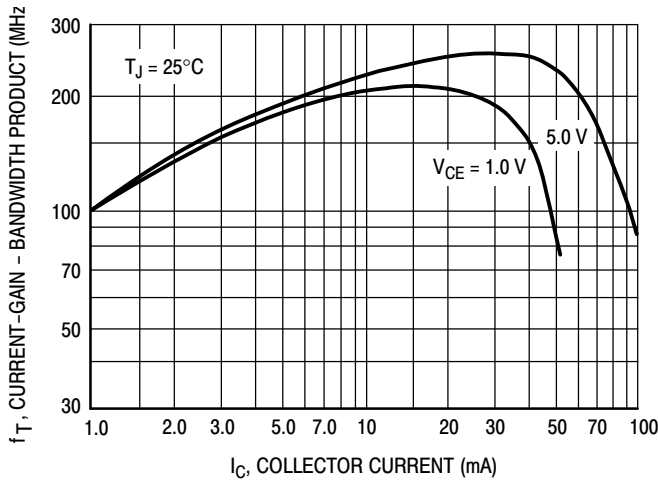


Figure 2. Current-Gain - Bandwidth Product

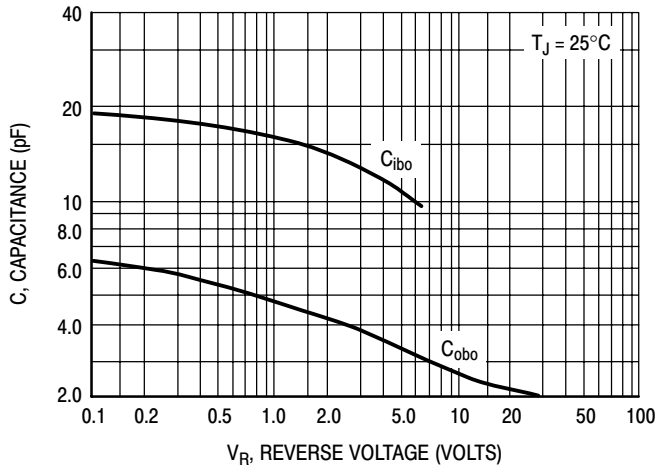


Figure 3. Capacitance

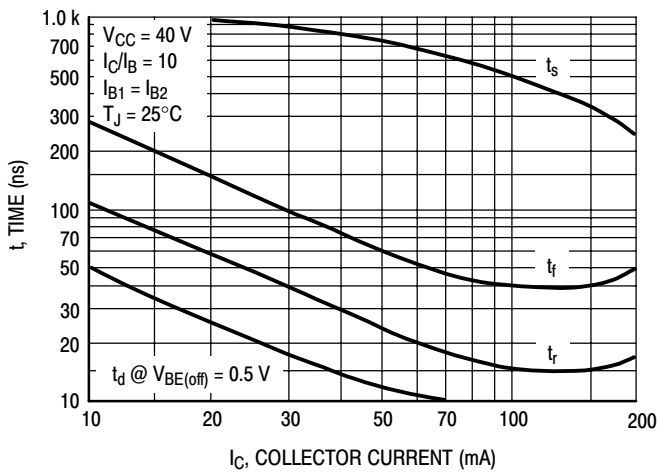


Figure 4. Switching Times

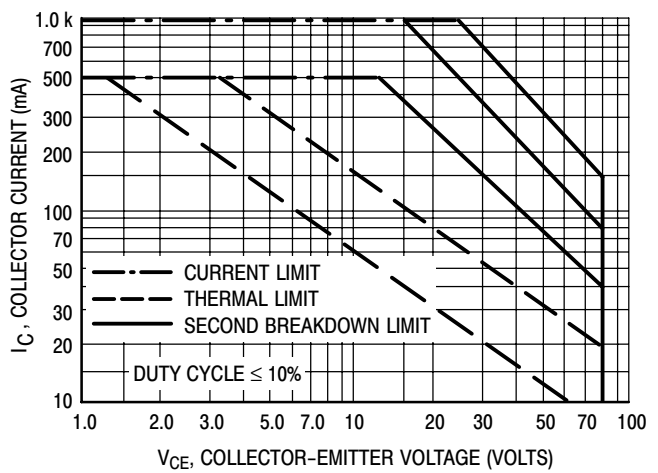


Figure 5. Active-Region Safe Operating Area

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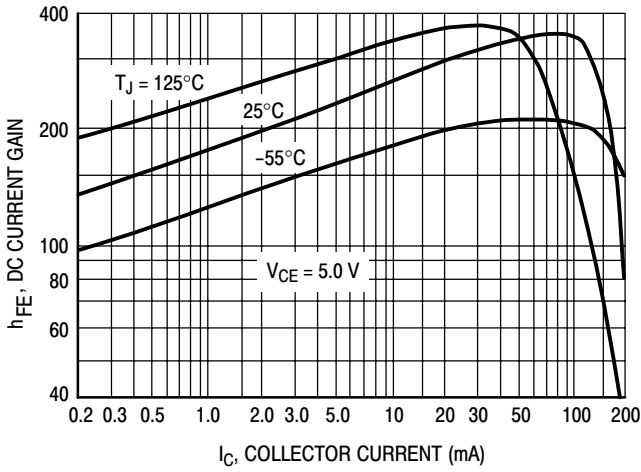


Figure 6. DC Current Gain

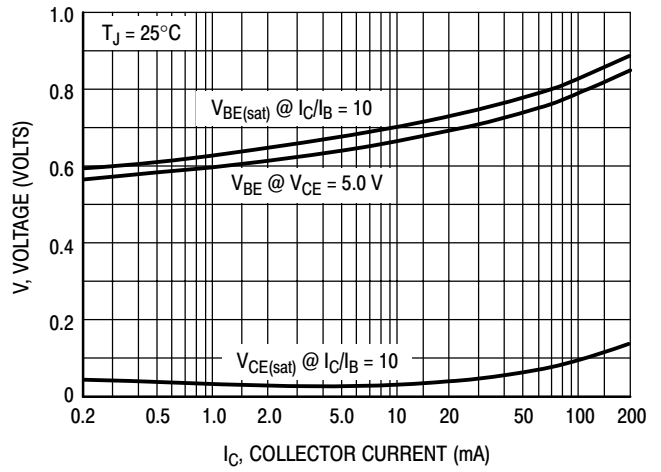


Figure 7. "ON" Voltages

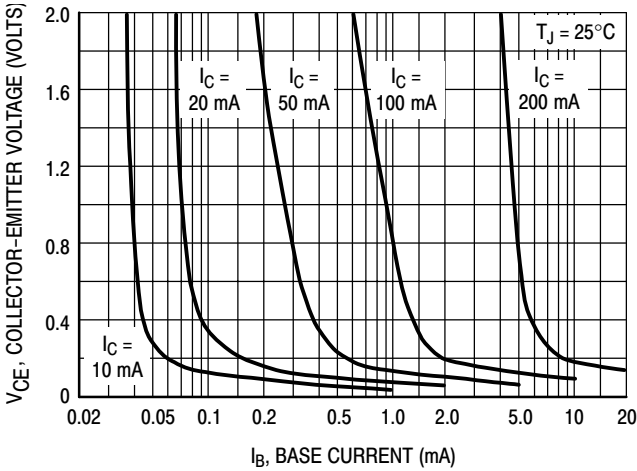


Figure 8. Collector Saturation Region

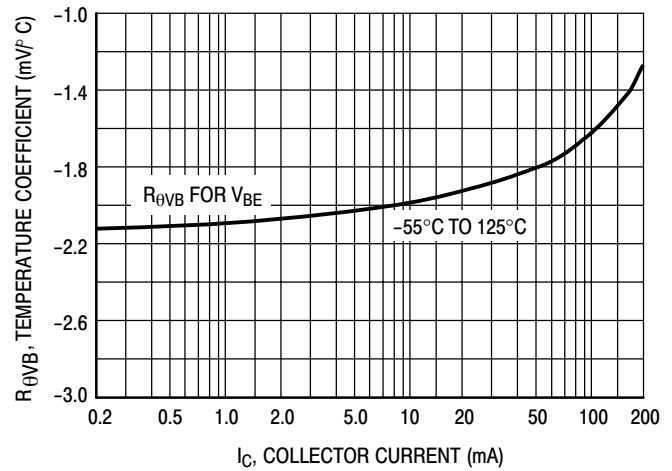


Figure 9. Base-Emitter Temperature Coefficient

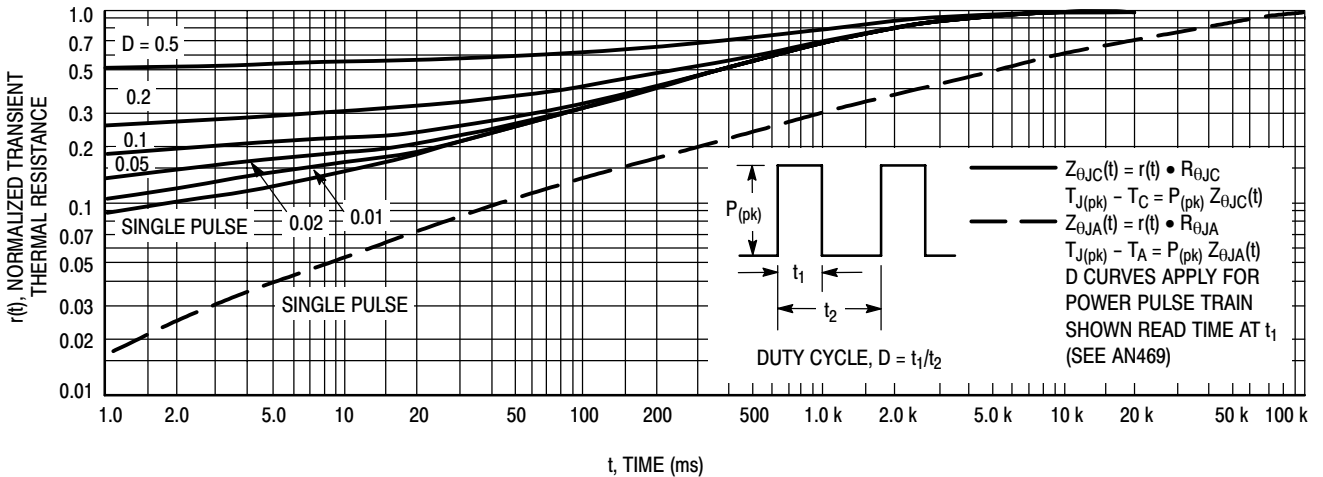
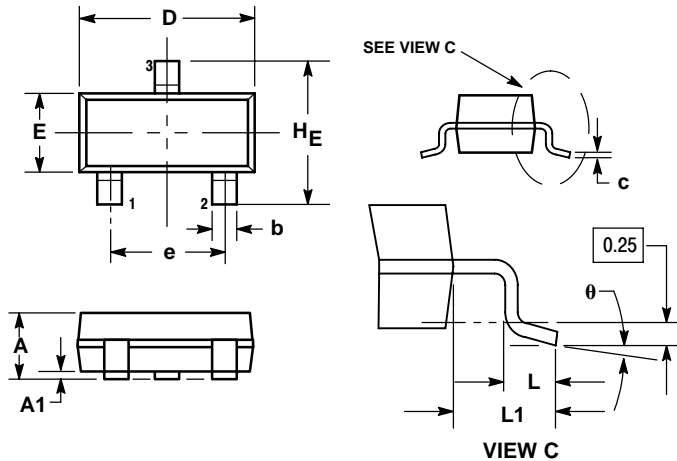


Figure 10. Thermal Response

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PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-08
ISSUE AN



NOTES:

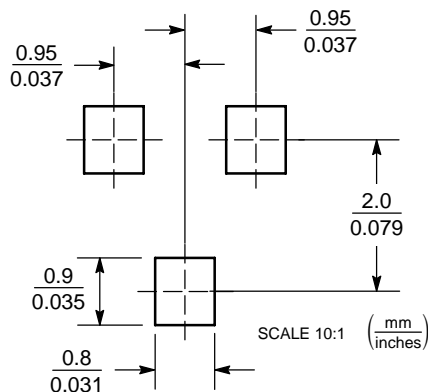
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.040 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.018 | 0.020 |
| c | 0.09 | 0.13 | 0.18 | 0.003 | 0.005 | 0.007 |
| D | 2.80 | 2.90 | 3.04 | 0.110 | 0.114 | 0.120 |
| E | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e | 1.78 | 1.90 | 2.04 | 0.070 | 0.075 | 0.081 |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.029 |
| HE | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |

STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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