

MBT35200MT1

High Current Surface Mount PNP Silicon Switching Transistor for Load Management in Portable Applications

Features

- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS (T_A = 25°C)

| Rating | Symbol | Max | Unit |
|--------------------------------|------------------|---------------------------|------|
| Collector-Emitter Voltage | V _{CEO} | -35 | Vdc |
| Collector-Base Voltage | V _{CBO} | -55 | Vdc |
| Emitter-Base Voltage | V _{EBO} | -5.0 | Vdc |
| Collector Current - Continuous | I _C | -2.0 | Adc |
| Collector Current - Peak | I _{CM} | -5.0 | A |
| Electrostatic Discharge | ESD | HBM Class 3 MM Class C | |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|---------------------------------------|----------------|-------------|
| Total Device Dissipation T _A = 25°C Derate above 25°C | P _D (Note 1) | 625 5.0 | mW mW/°C |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} (Note 1) | 200 | °C/W |
| Total Device Dissipation T _A = 25°C Derate above 25°C | P _D (Note 2) | 1.0 8.0 | W mW/°C |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} (Note 2) | 120 | °C/W |
| Thermal Resistance, Junction-to-Lead #1 | R _{θJL} | 80 | °C/W |
| Total Device Dissipation (Single Pulse < 10 sec.) | P _{Dsingle} (Notes 2 & 3) | 1.75 | W |
| Junction and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °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.

1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 X 1.0 inch Pad
3. ref: Figure 9

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



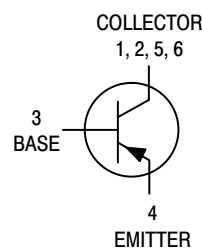
ON Semiconductor®

<http://onsemi.com>

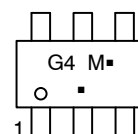
**35 VOLTS
2.0 AMPS
PNP TRANSISTOR**



**CASE 318G
TSOP-6
STYLE 6**



MARKING DIAGRAM



- G4 = Specific Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------|---------------------|------------------------|
| MBT35200MT1G | TSOP-6 (Pb-Free) | 3,000 / Tape & Reel |
| SMBT35200MT1G | TSOP-6 (Pb-Free) | 3,000 / 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.

MBT35200MT1

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

| Characteristic | Symbol | Min | Typical | Max | Unit |
|--|----------------------|-------------------|----------------------------|-------------------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (I _C = -10 mAdc, I _B = 0) | V _{(BR)CEO} | -35 | -45 | - | Vdc |
| Collector – Base Breakdown Voltage (I _C = -0.1 mAdc, I _E = 0) | V _{(BR)CBO} | -55 | -65 | - | Vdc |
| Emitter – Base Breakdown Voltage (I _E = -0.1 mAdc, I _C = 0) | V _{(BR)EBO} | -5.0 | -7.0 | - | Vdc |
| Collector Cutoff Current (V _{CB} = -35 Vdc, I _E = 0) | I _{CBO} | - | -0.03 | -0.1 | μAdc |
| Collector – Emitter Cutoff Current (V _{CES} = -35 Vdc) | I _{CES} | - | -0.03 | -0.1 | μAdc |
| Emitter Cutoff Current (V _{EB} = -4.0 Vdc) | I _{EBO} | - | -0.01 | -0.1 | μAdc |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (Note 1) (I _C = -1.0 A, V _{CE} = -1.5 V) (I _C = -1.5 A, V _{CE} = -1.5 V) (I _C = -2.0 A, V _{CE} = -3.0 V) | h _{FE} | 100 100 100 | 200 200 200 | - 400 - | |
| Collector – Emitter Saturation Voltage (Note 1) (I _C = -0.8 A, I _B = -0.008 A) (I _C = -1.2 A, I _B = -0.012 A) (I _C = -2.0 A, I _B = -0.02 A) | V _{CE(sat)} | - - - | -0.125 -0.175 -0.260 | -0.15 -0.20 -0.31 | V |
| Base – Emitter Saturation Voltage (Note 1) (I _C = -1.2 A, I _B = -0.012 A) | V _{BE(sat)} | - | -0.68 | -0.85 | V |
| Base – Emitter Turn-on Voltage (Note 1) (I _C = -2.0 A, V _{CE} = -3.0 V) | V _{BE(on)} | - | -0.81 | -0.875 | V |
| Cutoff Frequency (I _C = -100 mA, V _{CE} = -5.0 V, f = 100 MHz) | f _T | 100 | - | - | MHz |
| Input Capacitance (V _{EB} = -0.5 V, f = 1.0 MHz) | C _{ibo} | - | 600 | 650 | pF |
| Output Capacitance (V _{CB} = -3.0 V, f = 1.0 MHz) | C _{obo} | - | 85 | 100 | pF |
| Turn-on Time (V _{CC} = -10 V, I _{B1} = -100 mA, I _C = -1 A, R _L = 3 Ω) | t _{on} | - | 35 | - | nS |
| Turn-off Time (V _{CC} = -10 V, I _{B1} = I _{B2} = -100 mA, I _C = 1 A, R _L = 3 Ω) | t _{off} | - | 225 | - | nS |

1. Pulsed Condition: Pulse Width = 300 μsec, Duty Cycle ≤ 2%

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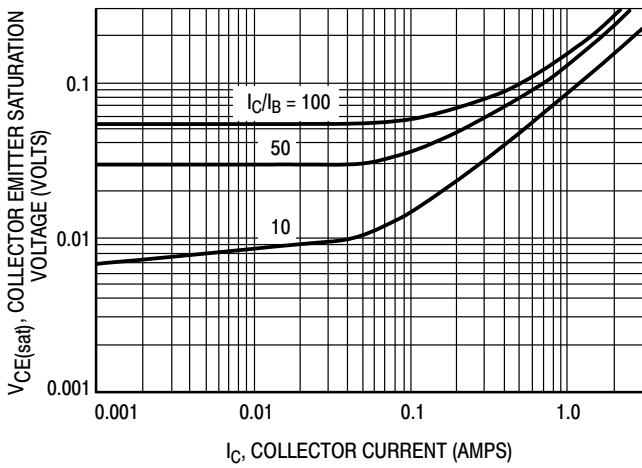


Figure 1. Collector Emitter Saturation Voltage versus Collector Current

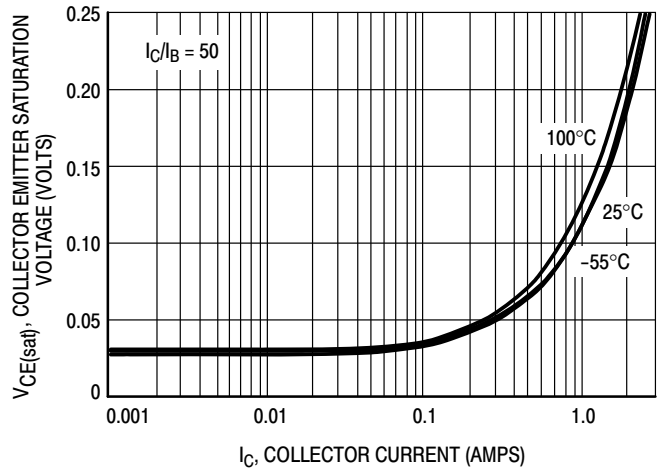


Figure 2. Collector Emitter Saturation Voltage versus Collector Current

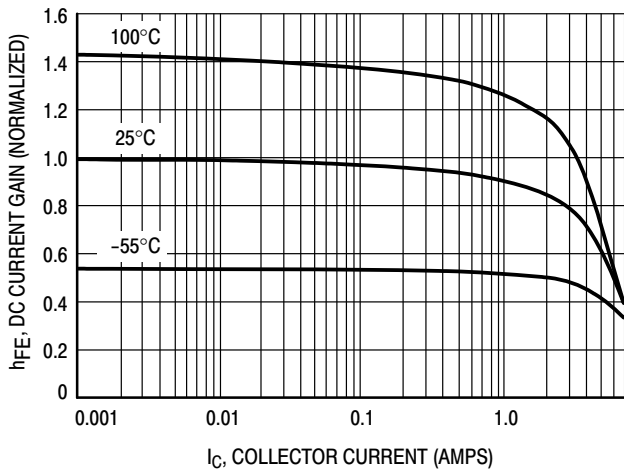


Figure 3. DC Current Gain versus Collector Current

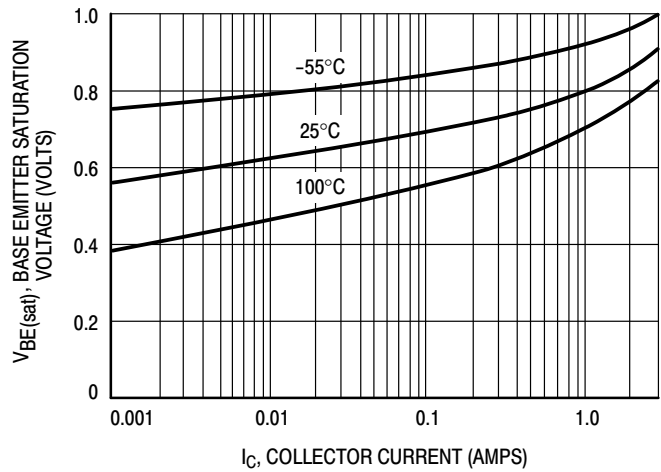


Figure 4. Base Emitter Saturation Voltage versus Collector Current

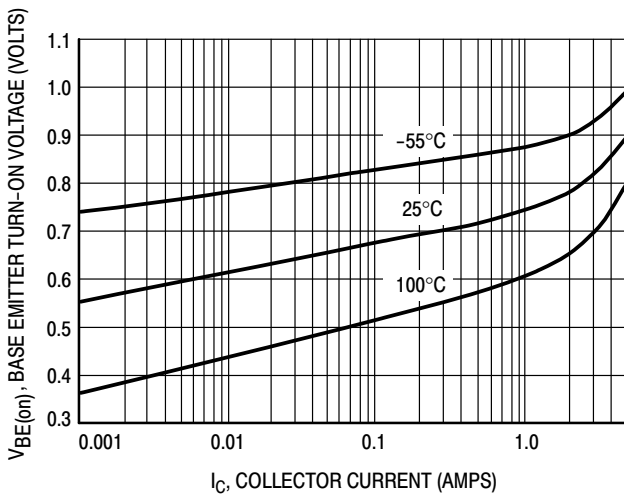


Figure 5. Base Emitter Turn-On Voltage versus Collector Current

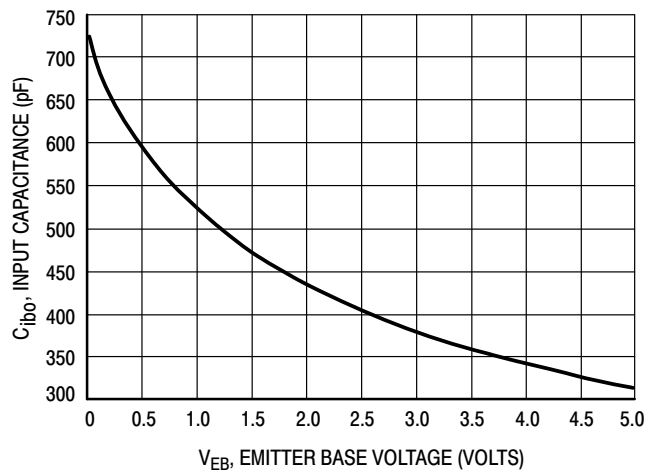


Figure 6. Input Capacitance

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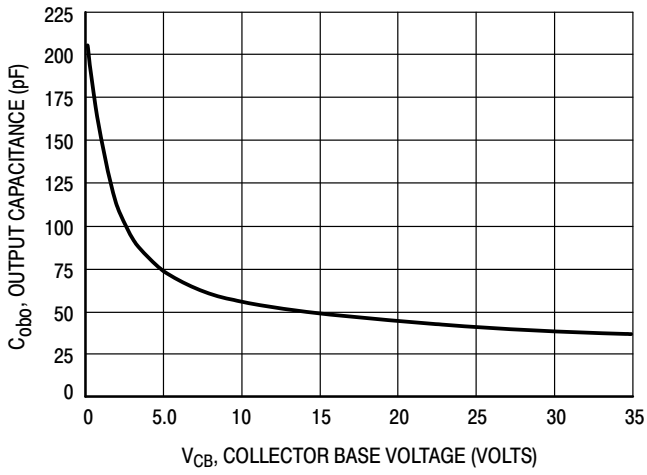


Figure 7. Output Capacitance

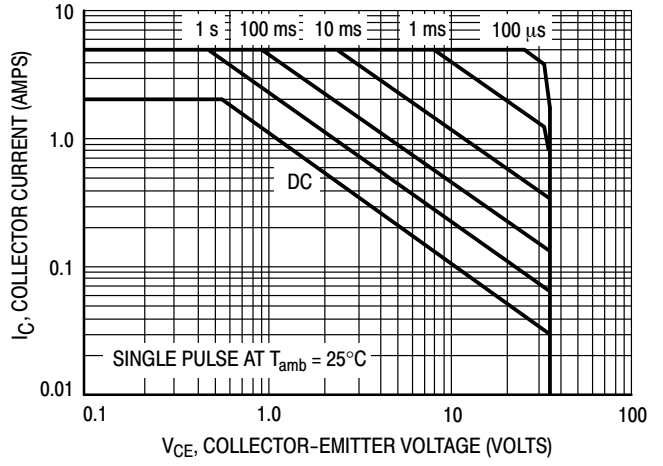


Figure 8. Safe Operating Area

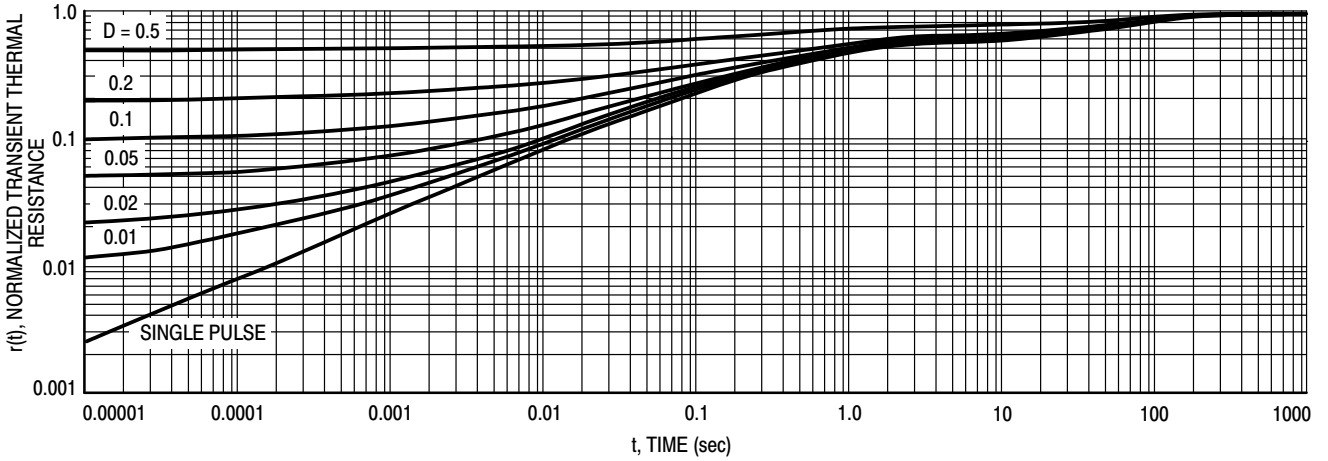


Figure 9. Normalized Thermal Response

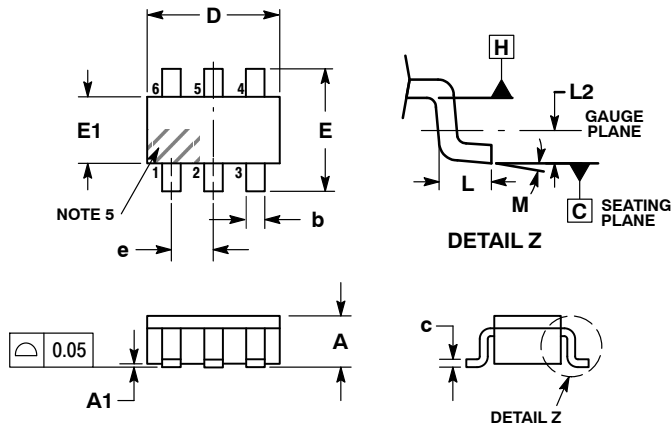
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 2:1

TSOP-6 CASE 318G-02 ISSUE V

DATE 12 JUN 2012



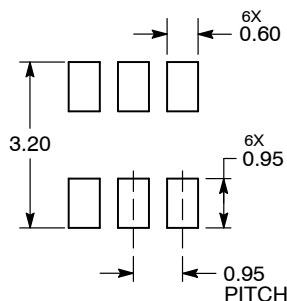
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.01 | 0.06 | 0.10 |
| b | 0.25 | 0.38 | 0.50 |
| c | 0.10 | 0.18 | 0.26 |
| D | 2.90 | 3.00 | 3.10 |
| E | 2.50 | 2.75 | 3.00 |
| E1 | 1.30 | 1.50 | 1.70 |
| e | 0.85 | 0.95 | 1.05 |
| L | 0.20 | 0.40 | 0.60 |
| L2 | 0.25 BSC | | |
| M | 0° | - | 10° |

- | | | | | | |
|--|--|---|---|---|--|
| <p>STYLE 1: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN</p> | <p>STYLE 2: PIN 1. EMITTER 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. BASE 2 6. COLLECTOR 2</p> | <p>STYLE 3: PIN 1. ENABLE 2. N/C 3. R BOOST 4. Vz 5. V in 6. V out</p> | <p>STYLE 4: PIN 1. N/C 2. V in 3. NOT USED 4. GROUND 5. ENABLE 6. LOAD</p> | <p>STYLE 5: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2</p> | <p>STYLE 6: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR</p> |
| <p>STYLE 7: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. N/C 5. COLLECTOR 6. EMITTER</p> | <p>STYLE 8: PIN 1. Vbus 2. D(in) 3. D(in)+ 4. D(out)+ 5. D(out) 6. GND</p> | <p>STYLE 9: PIN 1. LOW VOLTAGE GATE 2. DRAIN 3. SOURCE 4. DRAIN 5. DRAIN 6. HIGH VOLTAGE GATE</p> | <p>STYLE 10: PIN 1. D(OUT)+ 2. GND 3. D(OUT)- 4. D(IN)- 5. VBUS 6. D(IN)+</p> | <p>STYLE 11: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1/GATE 2</p> | <p>STYLE 12: PIN 1. I/O 2. GROUND 3. I/O 4. I/O 5. VCC 6. I/O</p> |
| <p>STYLE 13: PIN 1. GATE 1 2. SOURCE 2 3. GATE 2 4. DRAIN 2 5. SOURCE 1 6. DRAIN 1</p> | <p>STYLE 14: PIN 1. ANODE 2. SOURCE 3. GATE 4. CATHODE/DRAIN 5. CATHODE/DRAIN 6. CATHODE/DRAIN</p> | <p>STYLE 15: PIN 1. ANODE 2. SOURCE 3. GATE 4. DRAIN 5. N/C 6. CATHODE</p> | <p>STYLE 16: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE</p> | <p>STYLE 17: PIN 1. EMITTER 2. BASE 3. ANODE/CATHODE 4. ANODE 5. CATHODE 6. COLLECTOR</p> | |

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



IC

STANDARD

- | | |
|----------------------------|----------------------------|
| XXX = Specific Device Code | XXX = Specific Device Code |
| A = Assembly Location | M = Date Code |
| Y = Year | ▪ = Pb-Free Package |
| W = Work Week | |
| ▪ = Pb-Free Package | |

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

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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