

# 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<sub>A</sub> = 25°C)

| Rating                         | Symbol           | Max                       | Unit            |
|--------------------------------|------------------|---------------------------|-----------------|
| Collector-Emitter Voltage      | V <sub>CEO</sub> | -35                       | Vdc             |
| Collector-Base Voltage         | V <sub>CBO</sub> | -55                       | Vdc             |
| Emitter-Base Voltage           | V <sub>EBO</sub> | -5.0                      | Vdc             |
| Collector Current - Continuous | I <sub>C</sub>   | -2.0                      | A <sub>dc</sub> |
| Collector Current - Peak       | I <sub>CM</sub>  | -5.0                      | A               |
| Electrostatic Discharge        | ESD              | HBM Class 3<br>MM Class C |                 |

### THERMAL CHARACTERISTICS

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



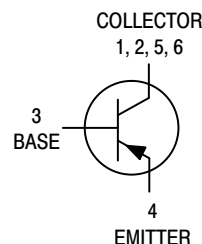
ON Semiconductor®

<http://onsemi.com>

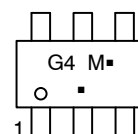
**35 VOLTS  
2.0 AMPS  
PNP TRANSISTOR**



**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<br>(Pb-Free) | 3,000 /<br>Tape & Reel |
| SMBT35200MT1G | TSOP-6<br>(Pb-Free) | 3,000 /<br>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.

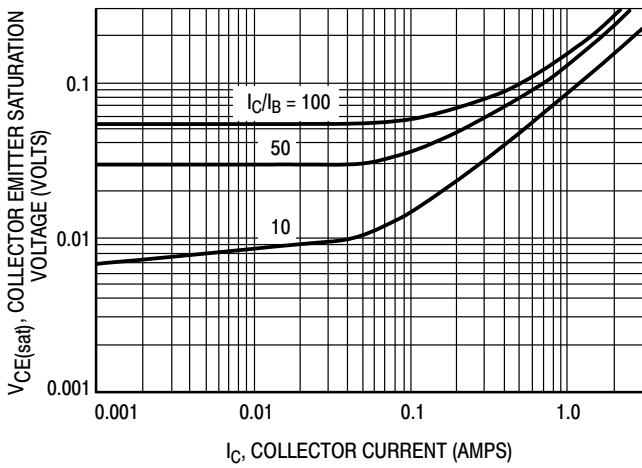
# MBT35200MT1

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

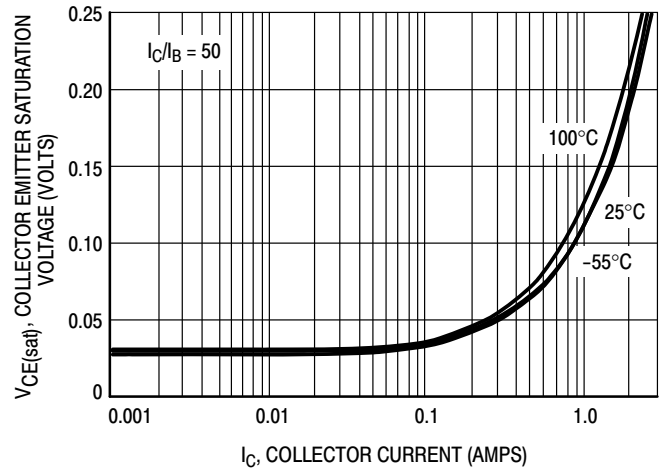
| Characteristic  | Symbol        | Min               | Typical                    | Max                     | Unit             |
|---|---------------|-------------------|----------------------------|-------------------------|------------------|
| <b>OFF CHARACTERISTICS</b>  |               |                   |                            |                         |                  |
| Collector – Emitter Breakdown Voltage<br>( $I_C = -10\text{ mA}$ , $I_B = 0$ )  | $V_{(BR)CEO}$ | -35               | -45                        | -                       | Vdc              |
| Collector – Base Breakdown Voltage<br>( $I_C = -0.1\text{ mA}$ , $I_E = 0$ )  | $V_{(BR)CBO}$ | -55               | -65                        | -                       | Vdc              |
| Emitter – Base Breakdown Voltage<br>( $I_E = -0.1\text{ mA}$ , $I_C = 0$ )  | $V_{(BR)EBO}$ | -5.0              | -7.0                       | -                       | Vdc              |
| Collector Cutoff Current<br>( $V_{CB} = -35\text{ Vdc}$ , $I_E = 0$ )   | $I_{CBO}$     | -                 | -0.03                      | -0.1                    | $\mu\text{A}$ dc |
| Collector – Emitter Cutoff Current<br>( $V_{CES} = -35\text{ Vdc}$ )  | $I_{CES}$     | -                 | -0.03                      | -0.1                    | $\mu\text{A}$ dc |
| Emitter Cutoff Current<br>( $V_{EB} = -4.0\text{ Vdc}$ )  | $I_{EBO}$     | -                 | -0.01                      | -0.1                    | $\mu\text{A}$ dc |
| <b>ON CHARACTERISTICS</b>   |               |                   |                            |                         |                  |
| DC Current Gain (Note 1)<br>( $I_C = -1.0\text{ A}$ , $V_{CE} = -1.5\text{ V}$ )<br>( $I_C = -1.5\text{ A}$ , $V_{CE} = -1.5\text{ V}$ )<br>( $I_C = -2.0\text{ A}$ , $V_{CE} = -3.0\text{ V}$ )                    | $h_{FE}$      | 100<br>100<br>100 | 200<br>200<br>200          | -<br>400<br>-           |                  |
| Collector – Emitter Saturation Voltage (Note 1)<br>( $I_C = -0.8\text{ A}$ , $I_B = -0.008\text{ A}$ )<br>( $I_C = -1.2\text{ A}$ , $I_B = -0.012\text{ A}$ )<br>( $I_C = -2.0\text{ A}$ , $I_B = -0.02\text{ A}$ ) | $V_{CE(sat)}$ | -<br>-<br>-       | -0.125<br>-0.175<br>-0.260 | -0.15<br>-0.20<br>-0.31 | V                |
| Base – Emitter Saturation Voltage (Note 1)<br>( $I_C = -1.2\text{ A}$ , $I_B = -0.012\text{ A}$ )   | $V_{BE(sat)}$ | -                 | -0.68                      | -0.85                   | V                |
| Base – Emitter Turn-on Voltage (Note 1)<br>( $I_C = -2.0\text{ A}$ , $V_{CE} = -3.0\text{ V}$ )   | $V_{BE(on)}$  | -                 | -0.81                      | -0.875                  | V                |
| Cutoff Frequency<br>( $I_C = -100\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ , $f = 100\text{ MHz}$ )  | $f_T$         | 100               | -                          | -                       | MHz              |
| Input Capacitance ( $V_{EB} = -0.5\text{ V}$ , $f = 1.0\text{ MHz}$ )   | $C_{ibo}$     | -                 | 600                        | 650                     | pF               |
| Output Capacitance ( $V_{CB} = -3.0\text{ V}$ , $f = 1.0\text{ MHz}$ )  | $C_{obo}$     | -                 | 85                         | 100                     | pF               |
| Turn-on Time ( $V_{CC} = -10\text{ V}$ , $I_{B1} = -100\text{ mA}$ , $I_C = -1\text{ A}$ , $R_L = 3\ \Omega$ )  | $t_{on}$      | -                 | 35                         | -                       | nS               |
| Turn-off Time ( $V_{CC} = -10\text{ V}$ , $I_{B1} = I_{B2} = -100\text{ mA}$ , $I_C = 1\text{ A}$ , $R_L = 3\ \Omega$ )   | $t_{off}$     | -                 | 225                        | -                       | nS               |

1. Pulsed Condition: Pulse Width = 300  $\mu\text{sec}$ , Duty Cycle  $\leq 2\%$

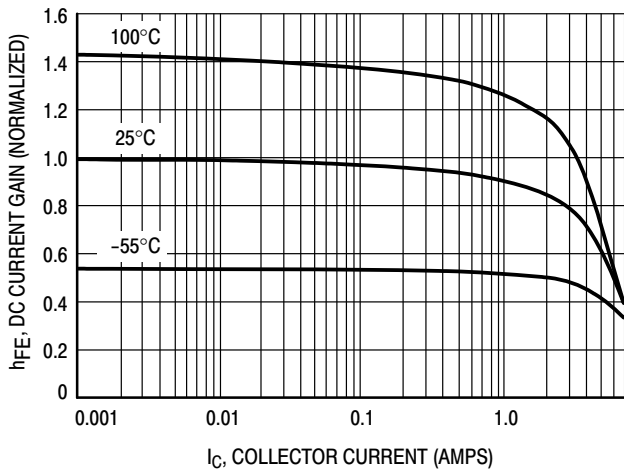
# MBT35200MT1



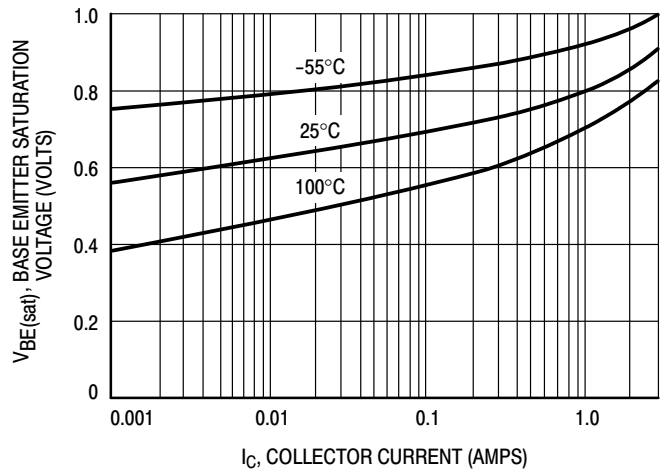
**Figure 1. Collector Emitter Saturation Voltage versus Collector Current**



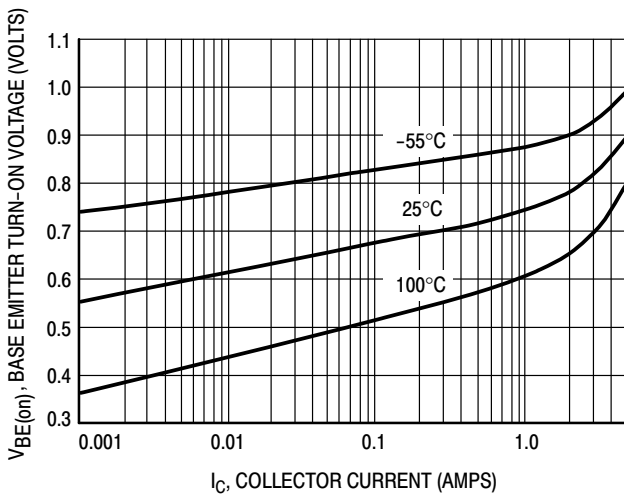
**Figure 2. Collector Emitter Saturation Voltage versus Collector Current**



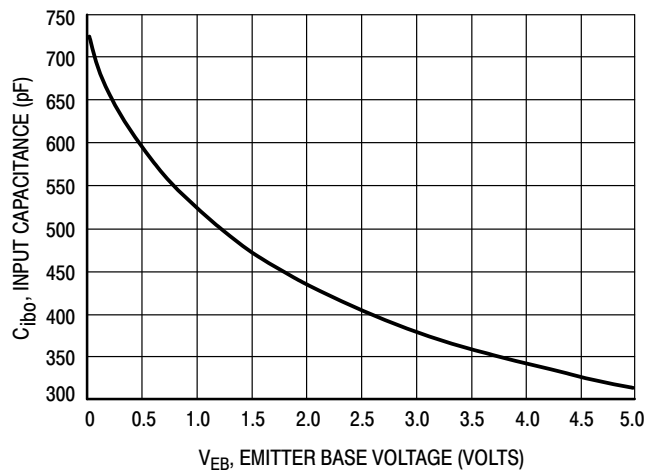
**Figure 3. DC Current Gain versus Collector Current**



**Figure 4. Base Emitter Saturation Voltage versus Collector Current**



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



**Figure 6. Input Capacitance**

# MBT35200MT1

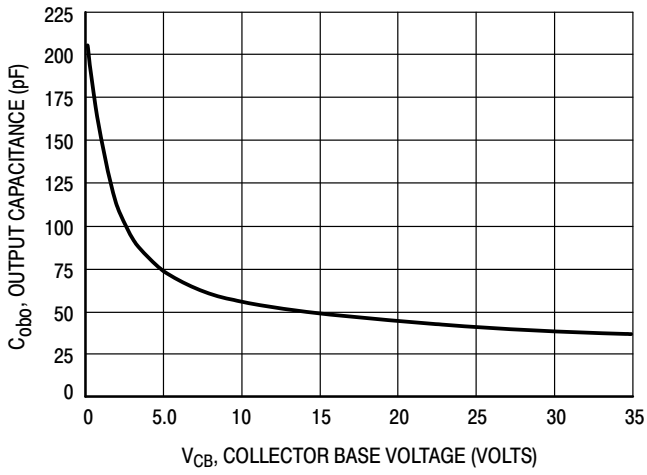


Figure 7. Output Capacitance

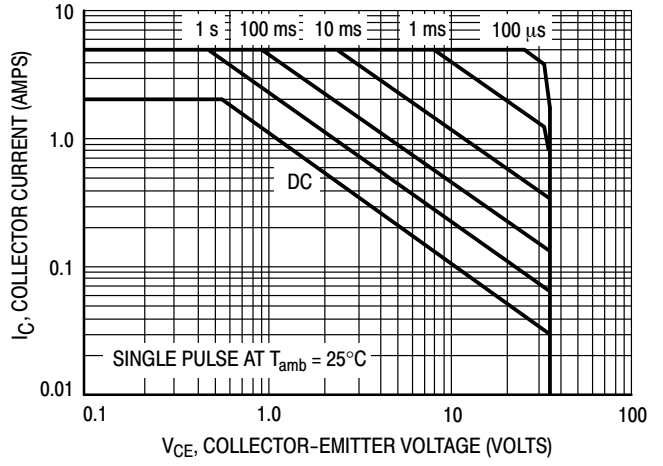


Figure 8. Safe Operating Area

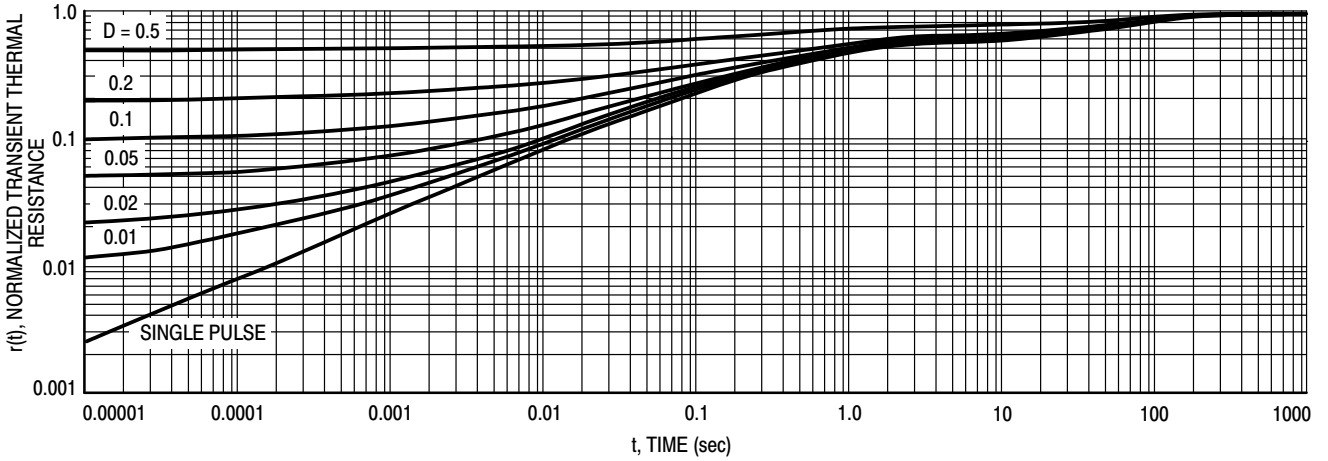


Figure 9. Normalized Thermal Response

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

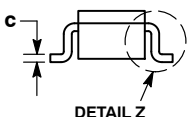
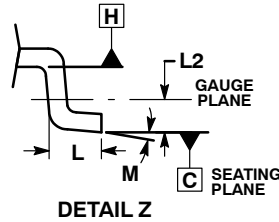
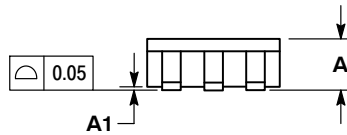
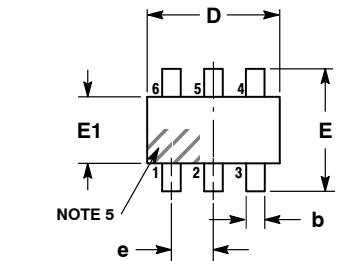
ON Semiconductor®



SCALE 2:1

### TSOP-6 CASE 318G-02 ISSUE V

DATE 12 JUN 2012



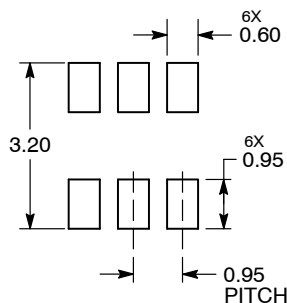
NOTES:

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

### RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

### GENERIC MARKING DIAGRAM\*



- |                            |                            |
|----------------------------|----------------------------|
| 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.

|                  |             |  |
|------------------|-------------|--|
| DOCUMENT NUMBER: | 98ASB14888C | Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | TSOP-6      | PAGE 1 OF 1  |

ON Semiconductor and ON are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

North American Technical Support:  
Voice Mail: 1 800-282-9855 Toll Free USA/Canada  
Phone: 011 421 33 790 2910

### Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for ON Semiconductor manufacturer:*

Other Similar products are found below :

[1.5SMC82AT3G](#) [74LCX574WM](#) [STK621-068C-E](#) [KAF-0402-ABA-CD-B2](#) [NBXSBA017LN1TAG](#) [KAF-3200-ABA-CP-B2](#) [STK621-728S-E](#) [AMIS30621AUA](#) [STK531U340A-E](#) [STK760-304-E](#) [FJAF6810DTU](#) [DBD250G](#) [STK621-713-E](#) [TIP115](#) [LB11847-E](#) [NBXHBA017LN1TAG](#) [LV8736V-MPB-H](#) [NCP694H12HT1G](#) [LA4631VC-XE](#) [CAT1025WI-25-G](#) [NDF04N60ZG-001](#) [LA78040B-S-E](#) [NGTB30N120IHLWG](#) [LA6584M-MPB-E](#) [NVB60N06T4G](#) [LA6245P-CL-TLM-E](#) [STK621-043D-E](#) [BTA30H-600CW3G](#) [NBXHBA017LNHTAG](#) [P6SMB100AT3G](#) [NCP1129AP100G](#) [LV8406T-TLM-E](#) [MC100EL13DWG](#) [NGTB30N60SWG](#) [FW217A-TL-2WX](#) [FGPF4533](#) [MC33201DG](#) [KA78L05AZTA](#) [KA378R33TU](#) [FST3126MX](#) [LV4904V-MPB-E](#) [STK672-400](#) [SBM30-03-TR-E](#) [NCP1398BDR2G](#) [BTA25H-600CW3G](#) [LC89057W-VF4A-E](#) [NGB8206ANTF4G](#) [NB7VQ58MMNG](#) [CPH6531-TL-E](#) [NCP4683DSQ28T1G](#)