

# Bipolar Power Transistors

## MMJT350

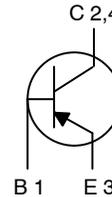
### PNP Silicon

Bipolar power transistors are designed for use in line-operated applications such as low power, line-operated series pass and switching regulators requiring PNP capability.

#### Features

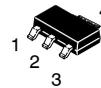
- High Collector–Emitter Sustaining Voltage
- Excellent DC Current Gain
- Epoxy Meets UL 94 V-0 @ 0.125 in
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant\*

0.5 AMPERE  
 POWER TRANSISTOR  
 PNP SILICON  
 300 VOLTS, 2.75 WATTS

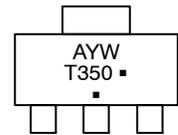


Schematic

#### MARKING DIAGRAM



SOT-223  
 CASE 318E  
 STYLE 1



- A = Assembly Location
- Y = Year
- W = Work Week
- = Pb-Free Package
- T350 = Device Code

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
MMJT350T1G	SOT-223 (Pb-Free)	1,000 / Tape & Reel
SMMJT350T1G	SOT-223 (Pb-Free)	1,000 / Tape & Reel
SMMJT350T3G	SOT-223 (Pb-Free)	4,000 / 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](http://BRD8011/D).

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

# MMJT350

## MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	300	Vdc
Collector–Base Voltage	$V_{CB}$	300	Vdc
Emitter–Base Voltage	$V_{EB}$	5.0	Vdc
Collector Current – Continuous	$I_C$	0.5	Adc
Collector Current – Peak	$I_{CM}$	0.75	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$ Total $P_D$ @ $T_A = 25^\circ\text{C}$ mounted on 1" sq. (645 sq. mm) Collector pad on FR–4 bd material Total $P_D$ @ $T_A = 25^\circ\text{C}$ mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR–4 bd material	$P_D$	2.75 22 1.40 0.65	W mW/ $^\circ\text{C}$ W W
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150	$^\circ\text{C}$
ESD – Human Body Model	HBM	3B	V
ESD – Machine Model	MM	C	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction–to–Case Junction–to–Ambient on 1" sq. (645 sq. mm) Collector pad on FR–4 bd material Junction–to–Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR–4 bd material	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	45 85 190	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ( $I_C = 1.0$ mA dc, $I_B = 0$ A dc)	$V_{CEO(SUS)}$	300	–	Vdc
Collector–Base Current ( $V_{CB} = \text{Rated } V_{CBO}, V_{EB} = 0$ )	$I_{CBO}$	–	100	nAdc
Emitter Cut–off Current ( $V_{BE} = 5.0$ Vdc)	$I_{EBO}$	–	100	nAdc

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 50$ mA dc, $V_{CE} = 10$ Vdc) ( $I_C = 100$ mA dc, $V_{CE} = 10$ Vdc)	$h_{FE}$	30 20	240 –	–
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Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# MMJT350

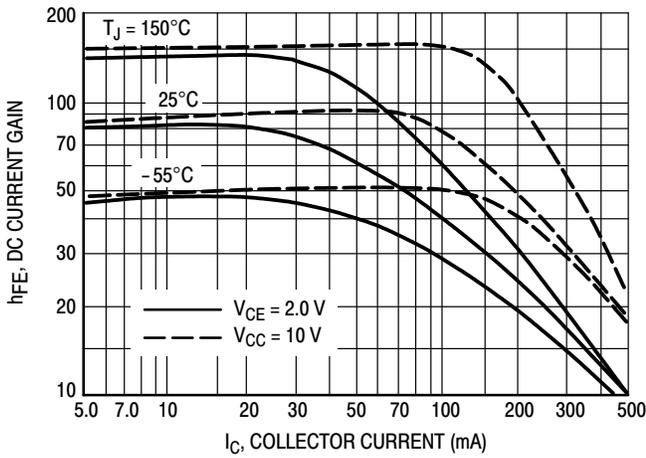


Figure 1. DC Current Gain

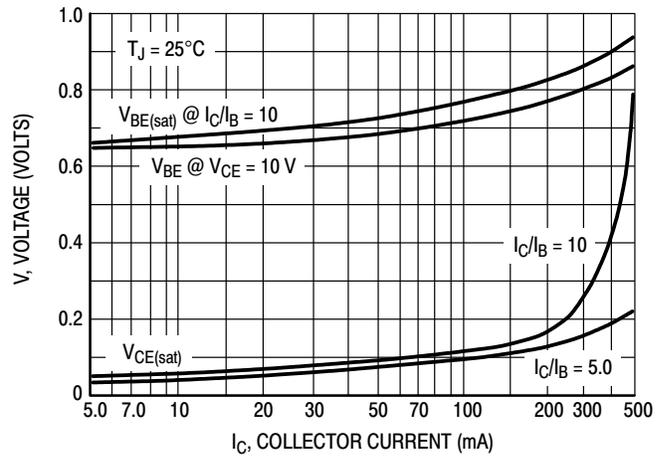


Figure 2. "On" Voltages

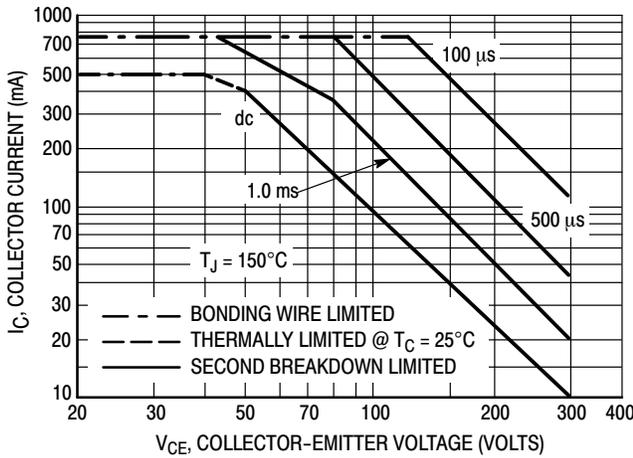


Figure 3. Active-Region Safe Operating Area

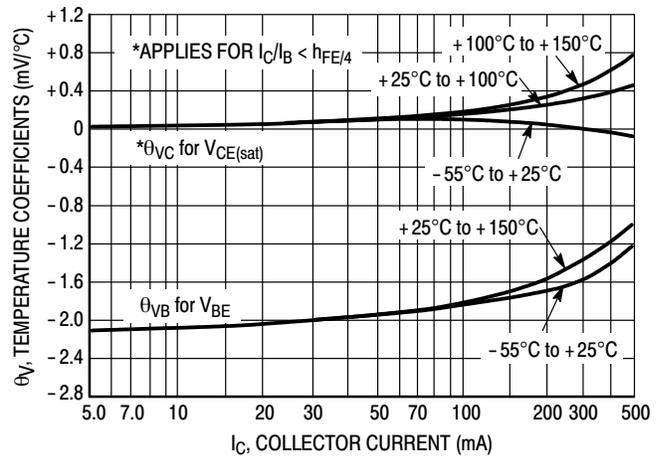


Figure 4. Temperature Coefficients

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 3 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ . At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

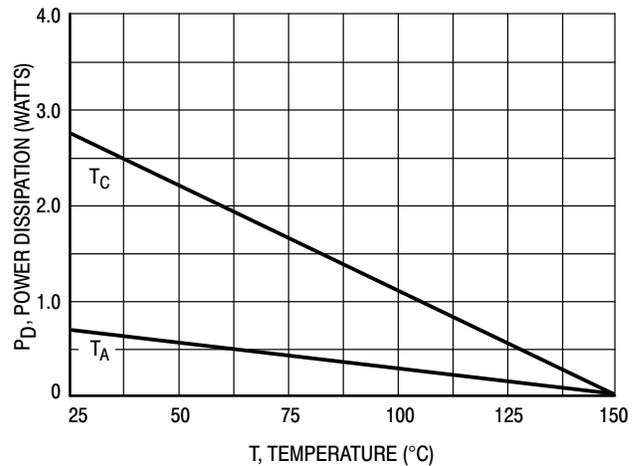


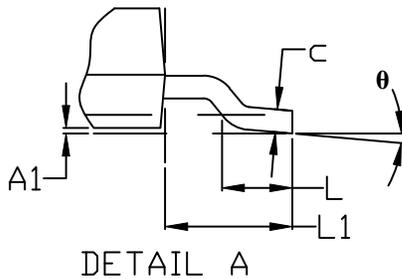
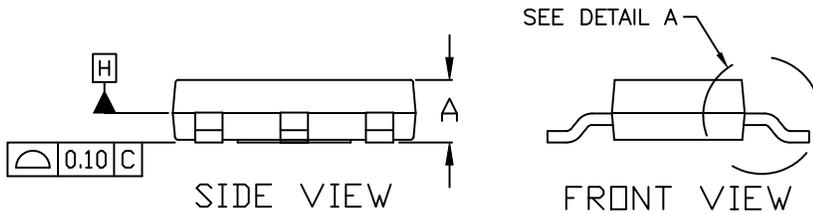
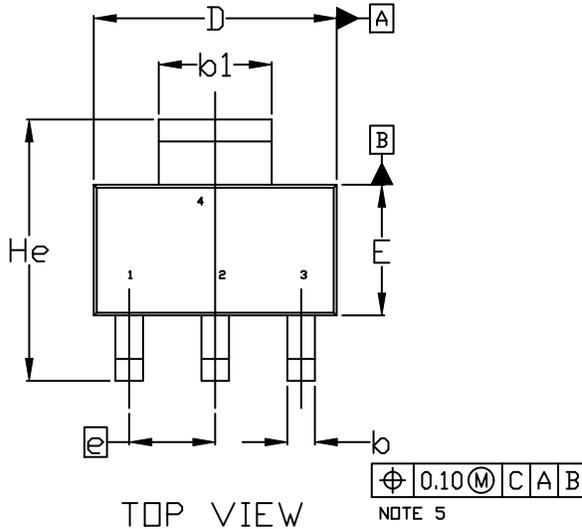
Figure 5. Power Derating



SCALE 1:1

**SOT-223 (TO-261)**  
CASE 318E-04  
ISSUE R

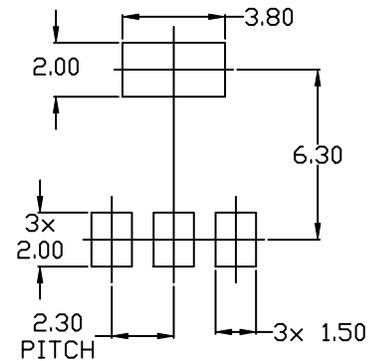
DATE 02 OCT 2018



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
θ	0°	---	10°



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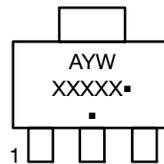
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**SOT-223 (TO-261)  
CASE 318E-04  
ISSUE R**

DATE 02 OCT 2018

- |                                                                              |                                                                             |                                                                               |                                                                       |                                                                       |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>STYLE 1:</b><br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | <b>STYLE 2:</b><br>PIN 1. ANODE<br>2. CATHODE<br>3. NC<br>4. CATHODE        | <b>STYLE 3:</b><br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN           | <b>STYLE 4:</b><br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE<br>4. DRAIN   | <b>STYLE 5:</b><br>PIN 1. DRAIN<br>2. GATE<br>3. SOURCE<br>4. GATE    |
| <b>STYLE 6:</b><br>PIN 1. RETURN<br>2. INPUT<br>3. OUTPUT<br>4. INPUT        | <b>STYLE 7:</b><br>PIN 1. ANODE 1<br>2. CATHODE<br>3. ANODE 2<br>4. CATHODE | <b>STYLE 8:</b><br>CANCELLED                                                  | <b>STYLE 9:</b><br>PIN 1. INPUT<br>2. GROUND<br>3. LOGIC<br>4. GROUND | <b>STYLE 10:</b><br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE<br>4. ANODE |
| <b>STYLE 11:</b><br>PIN 1. MT 1<br>2. MT 2<br>3. GATE<br>4. MT 2             | <b>STYLE 12:</b><br>PIN 1. INPUT<br>2. OUTPUT<br>3. NC<br>4. OUTPUT         | <b>STYLE 13:</b><br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR |                                                                       |                                                                       |

**GENERIC  
MARKING DIAGRAM\***



- A = Assembly Location
- Y = Year
- W = Work Week
- XXXXX = Specific Device Code
- = Pb-Free Package

(Note: Microdot may be in either location)

\*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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