

MMJT9410

Bipolar Power Transistors

NPN Silicon

Features

- SOT-223 Surface Mount Packaging
- Epoxy Meets UL 94 V-0 @ 0.125 in
- These Devices are Pb-Free and are RoHS Compliant

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector – Emitter Voltage	V_{CEO}	30	Vdc
Collector – Base Voltage	V_{CB}	45	Vdc
Emitter – Base Voltage	V_{EB}	± 6.0	Vdc
Base Current – Continuous	I_B	1.0	Adc
Collector Current – Continuous	I_C	3.0	Adc
Collector Current – Peak	I_{CM}	5.0	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°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	3.0 24 1.7 0.75	W mW/ $^\circ\text{C}$ 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 Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	42	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material	$R_{\theta JA}$	75	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material	$R_{\theta JA}$	165	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C}$



ON Semiconductor®

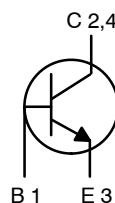
<http://onsemi.com>

POWER BJT

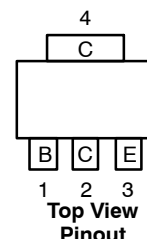
$I_C = 3.0$ AMPERES

$BV_{CEO} = 30$ VOLTS

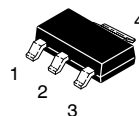
$V_{CE(sat)} = 0.2$ VOLTS



Schematic

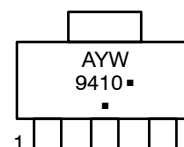


Top View
Pinout



SOT-223
CASE 318E
STYLE 1

MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
9410 = Device Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MMJT9410G	SOT-223 (Pb-Free)	1000 / 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.

MMJT9410

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

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage (I _C = 10 mAdc, I _B = 0 Adc)	V _{CE(sus)}	30	–	–	Vdc
Emitter-Base Voltage (I _E = 50 μAdc, I _C = 0 Adc)	V _{EBO}	6.0	–	–	Vdc
Collector Cutoff Current (V _{CE} = 25 Vdc, R _{BE} = 200 Ω) (V _{CE} = 25 Vdc, R _{BE} = 200 Ω, T _J = 125°C)	I _{CER}	– –	– –	20 200	μAdc
Emitter Cutoff Current (V _{BE} = 5.0 Vdc)	I _{EBO}	–	–	10	μAdc

ON CHARACTERISTICS (Note 1)

Collector-Emitter Saturation Voltage (I _C = 0.8 Adc, I _B = 20 mAdc) (I _C = 1.2 Adc, I _B = 20 mAdc) (I _C = 3.0 Adc, I _B = 0.3 Adc)	V _{CE(sat)}	– – –	0.105 0.150 –	0.150 0.200 0.450	Vdc
Base-Emitter Saturation Voltage (I _C = 3.0 Adc, I _B = 0.3 Adc)	V _{BE(sat)}	–	–	1.25	Vdc
Base-Emitter On Voltage (I _C = 1.2 Adc, V _{CE} = 4.0 Vdc)	V _{BE(on)}	–	–	1.10	Vdc
DC Current Gain (I _C = 0.8 Adc, V _{CE} = 1.0 Vdc) (I _C = 1.2 Adc, V _{CE} = 1.0 Vdc) (I _C = 3.0 Adc, V _{CE} = 1.0 Vdc)	h _{FE}	85 80 60	200 – –	– – –	–

DYNAMIC CHARACTERISTICS

Output Capacitance (V _{CB} = 10 Vdc, I _E = 0 Adc, f = 1.0 MHz)	C _{ob}	–	85	135	pF
Input Capacitance (V _{EB} = 8.0 Vdc)	C _{ib}	–	200	–	pF
Current-Gain – Bandwidth Product (Note 2) (I _C = 500 mA, V _{CE} = 10 Vdc, F _{test} = 1.0 MHz)	f _T	–	72	–	MHz

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. f_T = |h_{FE}| • f_{test}

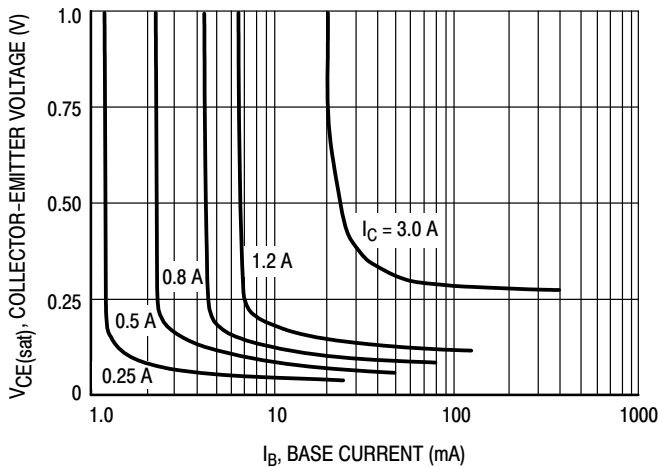


Figure 1. Collector Saturation Region

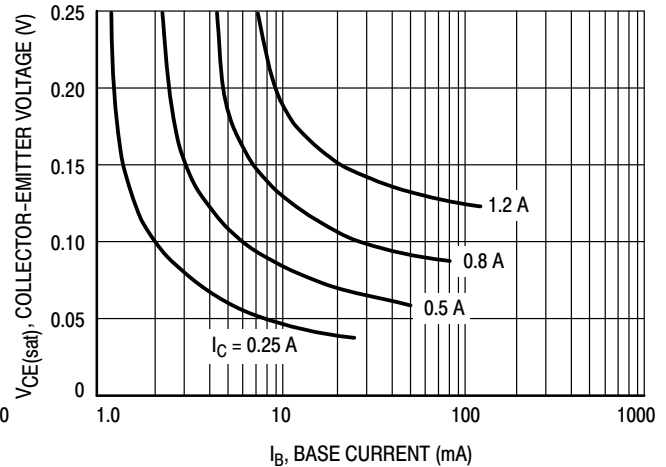


Figure 2. Collector Saturation Region

MMJT9410

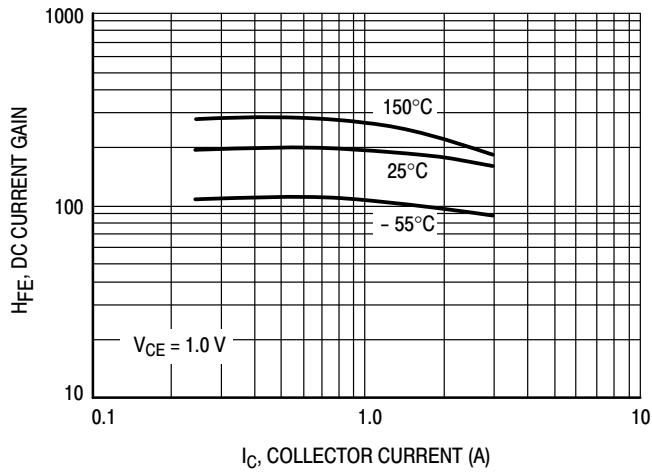


Figure 3. DC Current Gain

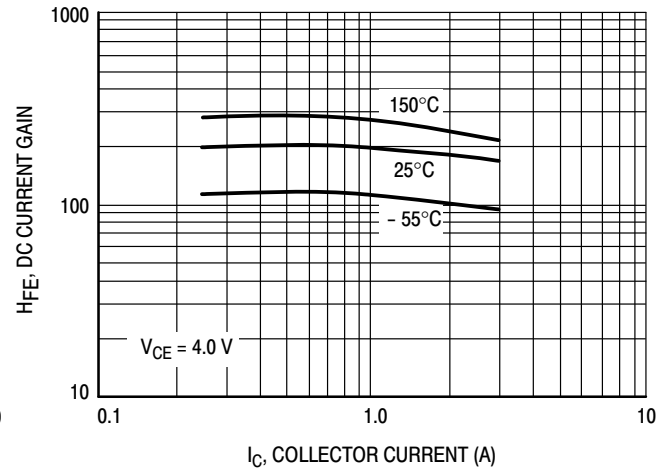


Figure 4. DC Current Gain

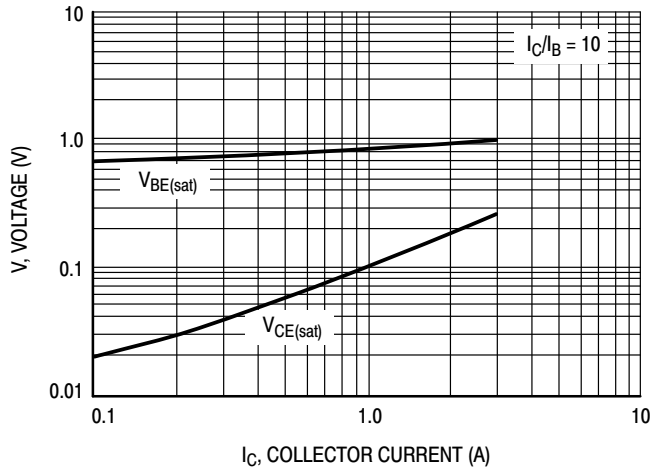


Figure 5. "On" Voltages

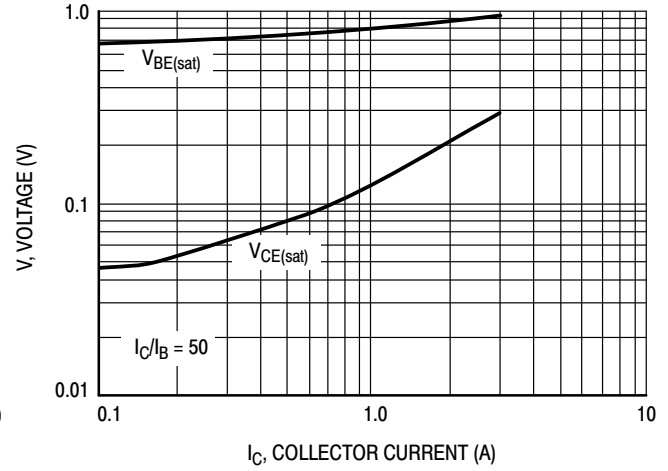


Figure 6. "On" Voltages

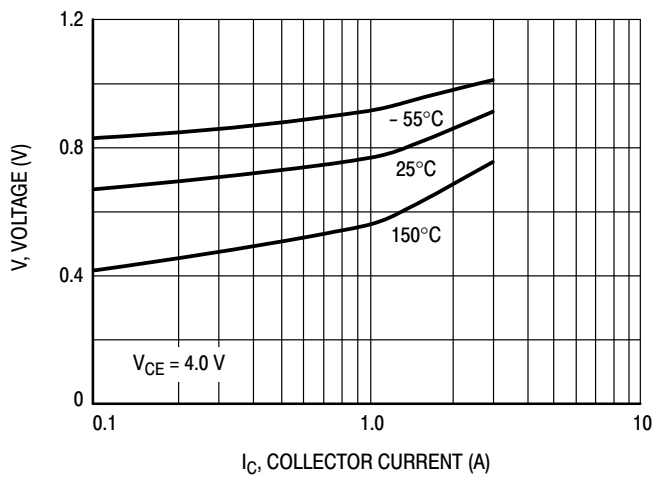


Figure 7. $V_{BE(on)}$ Voltage

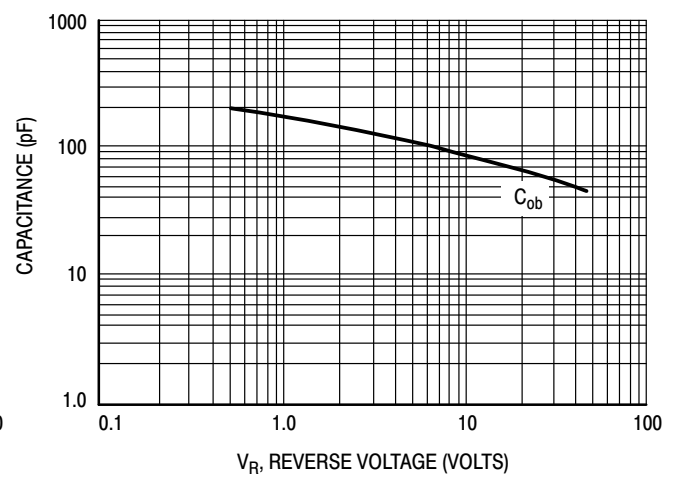


Figure 8. Capacitance

MMJT9410

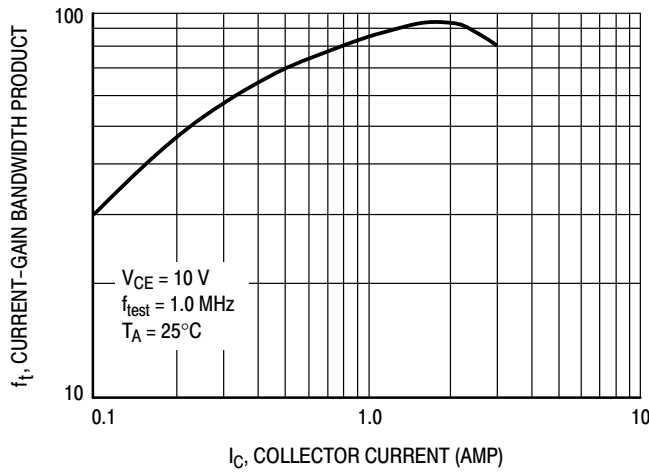


Figure 9. Current-Gain Bandwidth Product

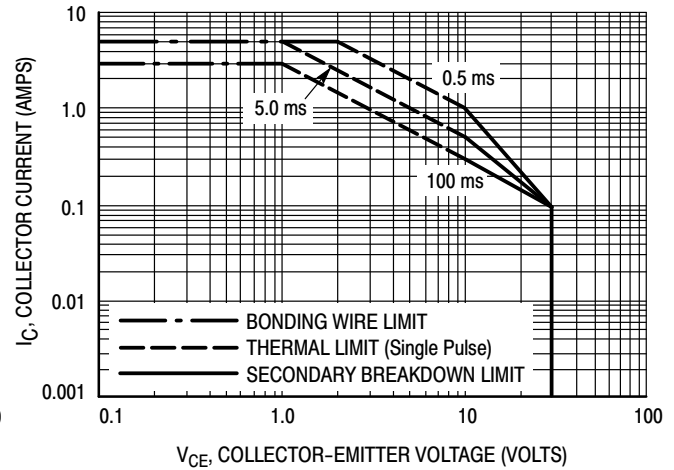


Figure 10. Active Region Safe Operating Area

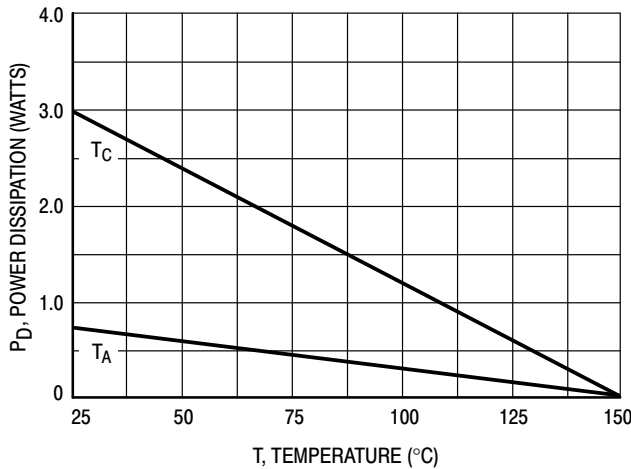


Figure 11. Power Derating

There are two limitations on the power handling ability of a transistor: average junction temperature and secondary 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 10 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Secondary breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 12. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

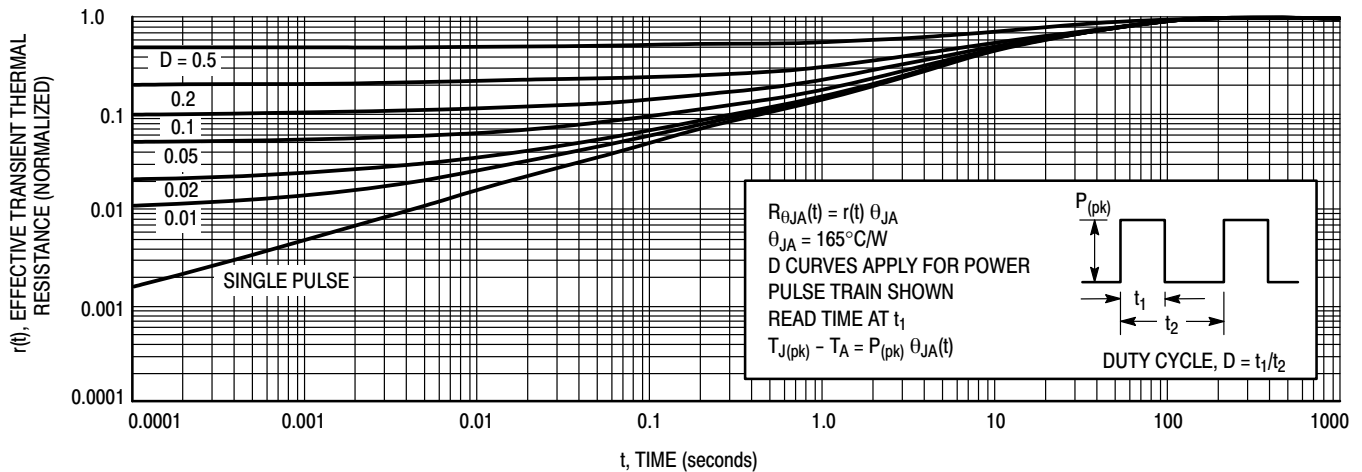


Figure 12. Thermal Response

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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 **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** 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 **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales