# **High Voltage PNP Silicon Plastic Power Transistors**

These devices are designed for line operated audio output amplifier, switch—mode power supply drivers and other switching applications.

#### **Features**

- Popular TO-220 Plastic Package
- PNP Complements to the TIP47 thru TIP50 Series
- These Devices are Pb-Free and are RoHS Compliant\*

#### **MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector–Emitter Voltage MJE5730 MJE5731 MJE5731A	V <sub>CEO</sub>	300 350 375	Vdc
Collector–Base Voltage MJE5730 MJE5731 MJE5731A	V <sub>CB</sub>	300 350 375	Vdc
Emitter-Base Voltage	V <sub>EB</sub>	5.0	Vdc
Collector Current – Continuous	I <sub>C</sub>	1.0	Adc
Collector Current – Peak	I <sub>CM</sub>	3.0	Adc
Base Current	Ι <sub>Β</sub>	1.0	Adc
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	40 0.32	W W/°C
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	2.0 0.016	W W/°C
Unclamped Inducting Load Energy (See Figure 10)	E	20	mJ
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to +150	°C

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

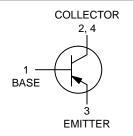
Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.125	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°C/W

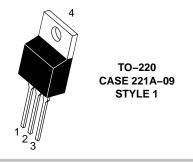


ON Semiconductor®

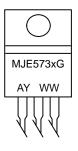
www.onsemi.com

# 1.0 AMPERE POWER TRANSISTORS PCP SILICON 300-350-400 VOLTS 50 WATTS





# **MARKING DIAGRAM**



MJE573x = Device Code

x = 0, 1, or 1A

G = Pb-Free Package A = Assembly Location

Y = Year WW = Work Week

## **ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

# **ELECTRICAL CHARACTERISTICS** (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS	1 1		•	•
Collector–Emitter Sustaining Voltage (Note 1) (I <sub>C</sub> = 30 mAdc, I <sub>B</sub> = 0) MJE5730 MJE5731 MJE5731A	V <sub>CEO(sus)</sub>	300 350 375	- - -	Vdc
Collector Cutoff Current $ \begin{aligned} &(V_{CE} = 200 \ Vdc, \ I_{B} = 0) \\ & MJE5730 \end{aligned} \\ &(V_{CE} = 250 \ Vdc, \ I_{B} = 0) \\ & MJE5731 \end{aligned} \\ &(V_{CE} = 300 \ Vdc, \ I_{B} = 0) \\ & MJE5731A \end{aligned}$	ICEO	- - -	1.0 1.0 1.0	mAdc
Collector Cutoff Current $ \begin{aligned} &(V_{CE} = 300 \; Vdc, \; V_{BE} = 0) \\ & \; MJE5730 \end{aligned} \\ &(V_{CE} = 350 \; Vdc, \; V_{BE} = 0) \\ &\; MJE5731 \end{aligned} \\ &(V_{CE} = 400 \; Vdc, \; V_{BE} = 0) \\ &\; MJE5731A \end{aligned} $	Ices	- - -	1.0 1.0 1.0	mAdc
Emitter Cutoff Current (V <sub>BE</sub> = 5.0 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	-	1.0	mAdc
ON CHARACTERISTICS (Note 1)	<del>.</del>		•	•
DC Current Gain ( $I_C = 0.3$ Adc, $V_{CE} = 10$ Vdc) ( $I_C = 1.0$ Adc, $V_{CE} = 10$ Vdc)	h <sub>FE</sub>	30 10	150 -	_
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 0.2 Adc)	V <sub>CE(sat)</sub>	-	1.0	Vdc
Base–Emitter On Voltage ( $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ )	V <sub>BE(on)</sub>	-	1.5	Vdc
DYNAMIC CHARACTERISTICS	·			
Current Gain – Bandwidth Product $(I_C = 0.2 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 2.0 \text{ MHz})$	f⊤	10	-	MHz
Small–Signal Current Gain (I <sub>C</sub> = 0.2 Adc, V <sub>CE</sub> = 10 Vdc, f = 1.0 kHz)	h <sub>fe</sub>	25	_	_

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.

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

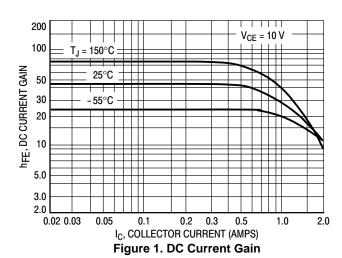


Figure 2. Collector-Emitter Saturation Voltage

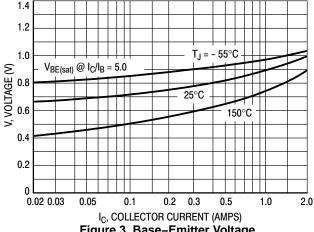


Figure 3. Base-Emitter Voltage

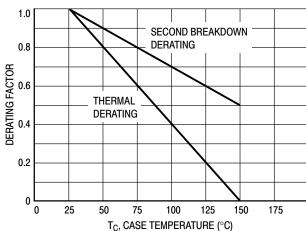


Figure 4. Normalized Power Derating

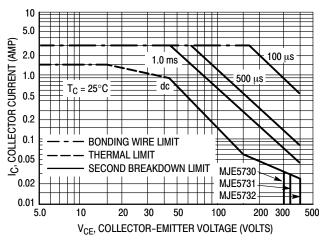


Figure 5. Forward Bias Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I<sub>C</sub> - V<sub>CE</sub> 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 5 is based on  $T_{J(pk)} = 150^{\circ}C$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \le 150$  °C.  $T_{J(pk)}$  may be calculated from the data in Figure 6. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

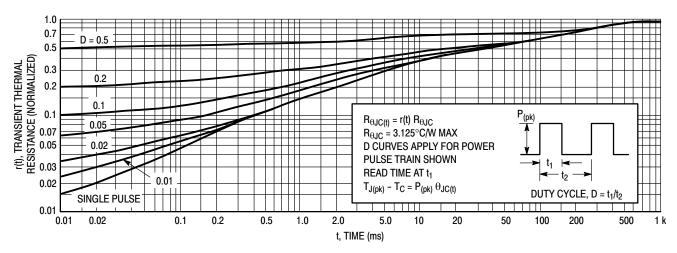


Figure 6. Thermal Response

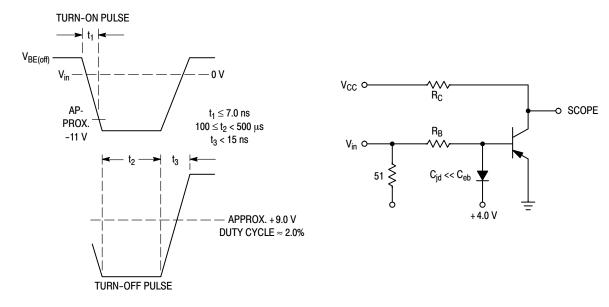


Figure 7. Switching Time Equivalent Circuit

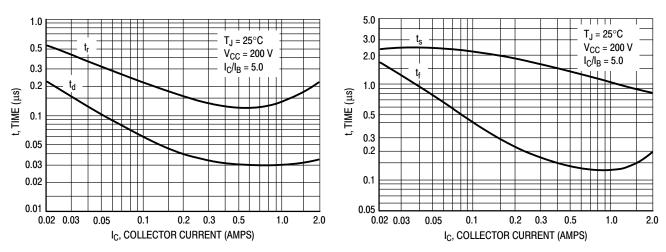
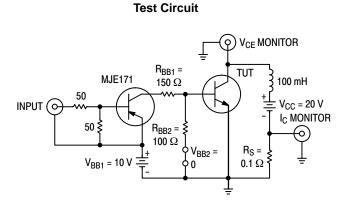


Figure 8. Turn-On Resistive Switching Times

Figure 9. Resistive Turn-Off Switching Times



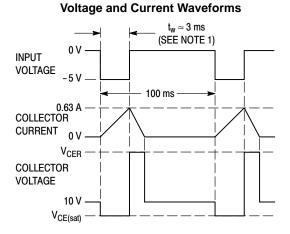


Figure 10. Inductive Load Switching

# **ORDERING INFORMATION**

Device	Package	Shipping
MJE5730G	TO-220 (Pb-Free)	50 Units / Rail
MJE5731G	TO-220 (Pb-Free)	50 Units / Rail
MJE5731AG	TO-220 (Pb-Free)	50 Units / Rail

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 <a href="www.onsemi.com/site/pdf/Patent-Marking.pdf">www.onsemi.com/site/pdf/Patent-Marking.pdf</a>. 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 with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase

#### ADDITIONAL INFORMATION

**TECHNICAL PUBLICATIONS:** 

 $\textbf{Technical Library:} \ \underline{www.onsemi.com/design/resources/technical-documentation}$ 

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