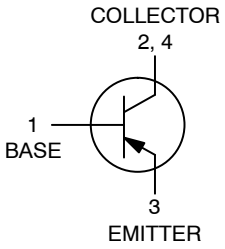
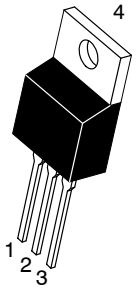
High Voltage PNP Silicon Plastic Power Transistors

MJE5730, MJE5731, MJE5731A

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

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





TO−220
CASE 221A−09
STYLE 1

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_{CEO}	 300 350 375	Vdc
Collector−Base Voltage MJE5730 MJE5731 MJE5731A	V_{CB}	 300 350 375	Vdc
Emitter−Base Voltage	V_{EB}	5.0	Vdc
Collector Current − Continuous	I_C	1.0	Adc
Collector Current − Peak	I_{CM}	3.0	Adc
Base Current	I_B	1.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 40 0.32	 W W/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 2.0 0.016	 W W/°C
Unclamped Inducting Load Energy (See Figure 10)	E	20	mJ
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C

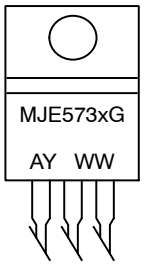
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

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

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 on page 5 of this data sheet.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (Note 1) (I_C = 30 mAdc, I_B = 0) MJE5730 MJE5731 MJE5731A	$V_{CEO(sus)}$	 300 350 375	 – – –	Vdc
Collector Cutoff Current (V_{CE} = 200 Vdc, I_B = 0) MJE5730 (V_{CE} = 250 Vdc, I_B = 0) MJE5731 (V_{CE} = 300 Vdc, I_B = 0) MJE5731A	I_{CEO}	 – – –	 1.0 1.0 1.0	mAdc
Collector Cutoff Current (V_{CE} = 300 Vdc, V_{BE} = 0) MJE5730 (V_{CE} = 350 Vdc, V_{BE} = 0) MJE5731 (V_{CE} = 400 Vdc, V_{BE} = 0) MJE5731A	I_{CES}	 – – –	 1.0 1.0 1.0	mAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	 –	 1.0	mAdc
ON CHARACTERISTICS (Note 1)				
DC Current Gain (I_C = 0.3 Adc, V_{CE} = 10 Vdc) (I_C = 1.0 Adc, V_{CE} = 10 Vdc)	h_{FE}	 30 10	 150 –	–
Collector−Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 0.2 Adc)	$V_{CE(sat)}$	 –	 1.0	Vdc
Base−Emitter On Voltage (I_C = 1.0 Adc, V_{CE} = 10 Vdc)	$V_{BE(on)}$	 –	 1.5	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain − Bandwidth Product (I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 2.0 MHz)	f_T	 10	 –	MHz
Small−Signal Current Gain (I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	 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%.

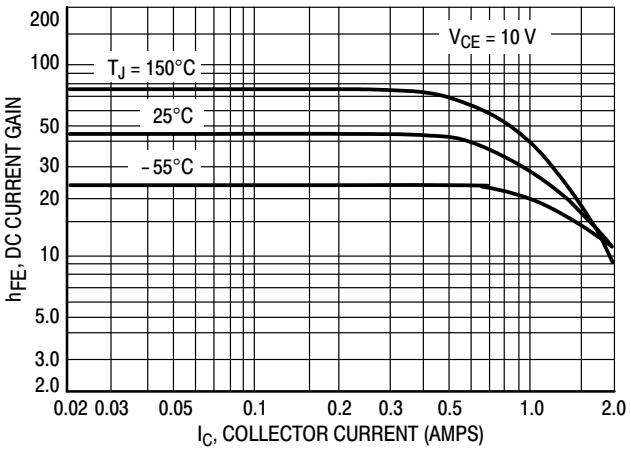


Figure 1. DC Current Gain

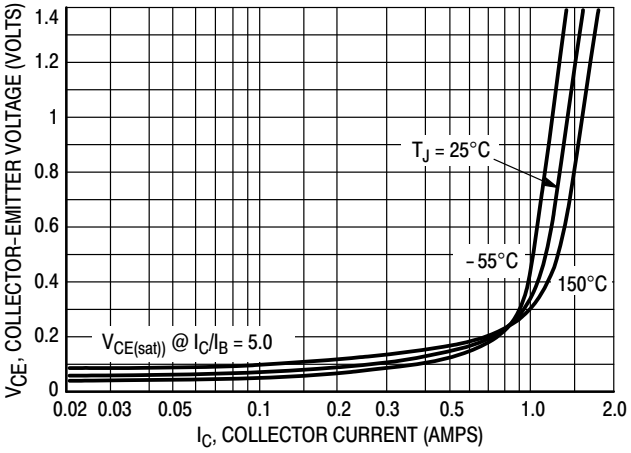


Figure 2. Collector−Emitter Saturation Voltage

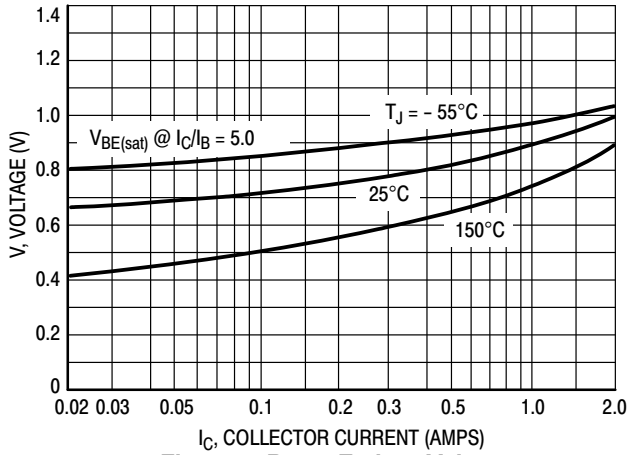


Figure 3. Base−Emitter Voltage

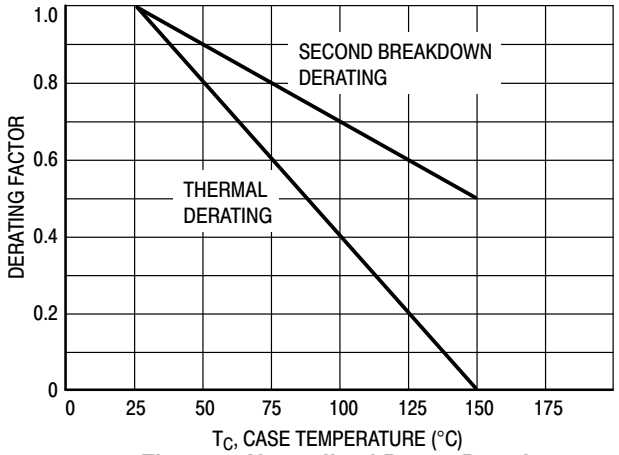


Figure 4. Normalized Power Derating

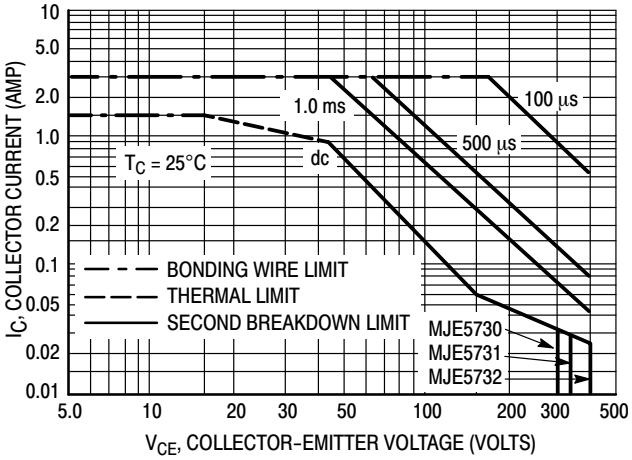


Figure 5. Forward Bias Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ 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 5 is based on $T_{J(pk)}$ = 150°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.

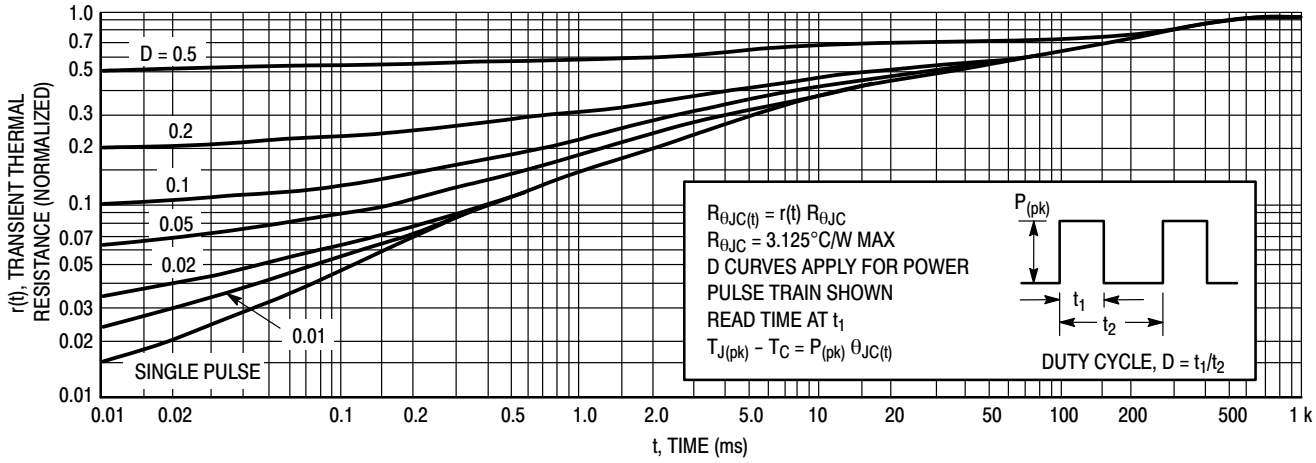


Figure 6. Thermal Response

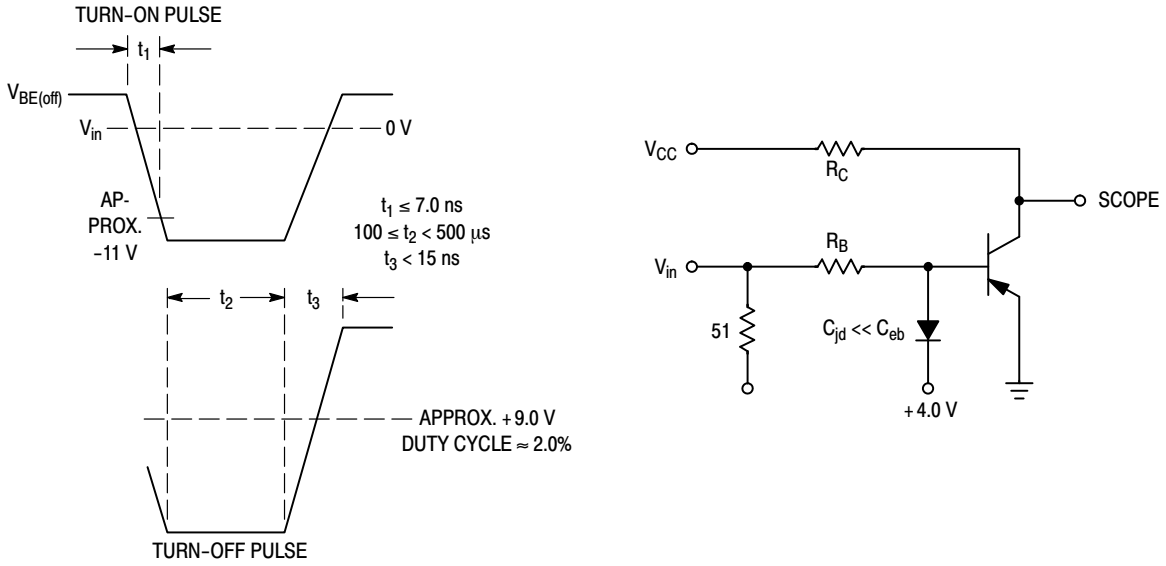


Figure 7. Switching Time Equivalent Circuit

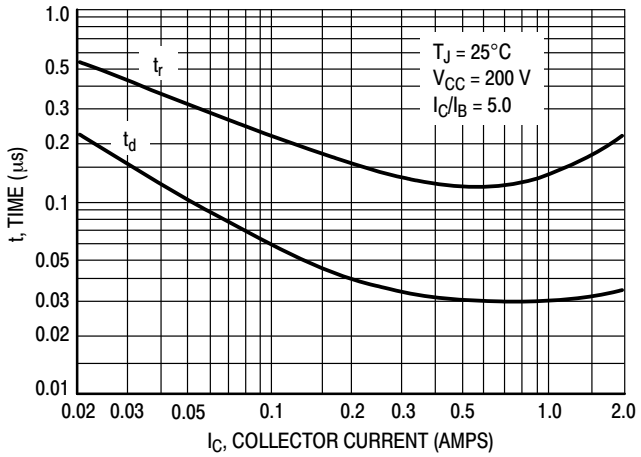


Figure 8. Turn−On Resistive Switching Times

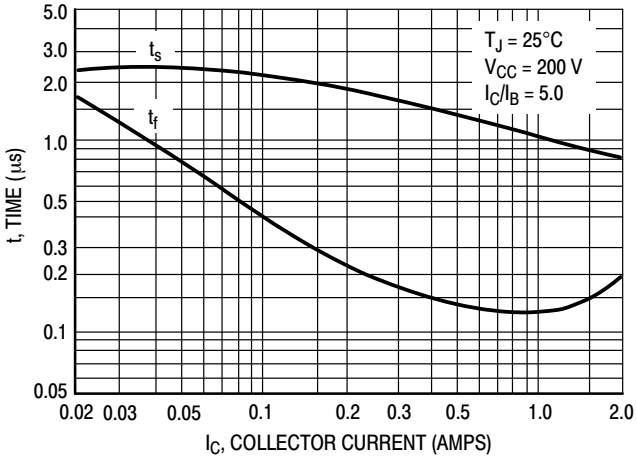
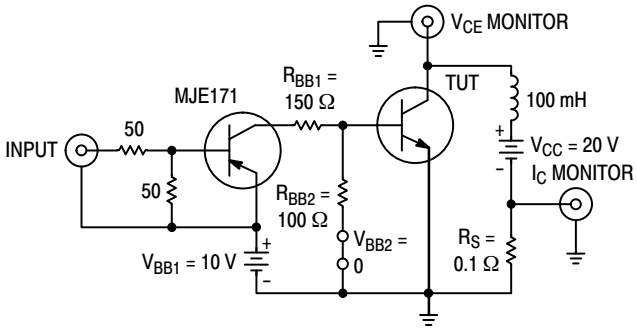


Figure 9. Resistive Turn−Off Switching Times

Test Circuit



Voltage and Current Waveforms

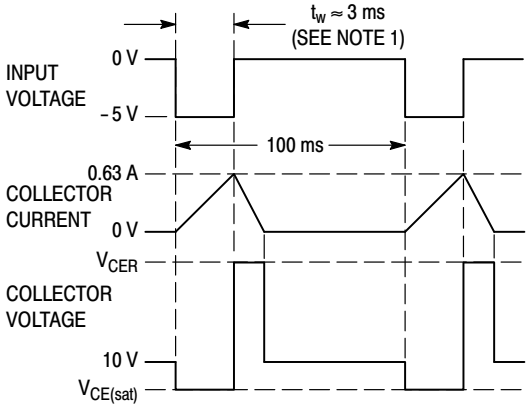
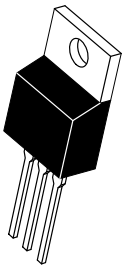


Figure 10. Inductive Load Switching

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

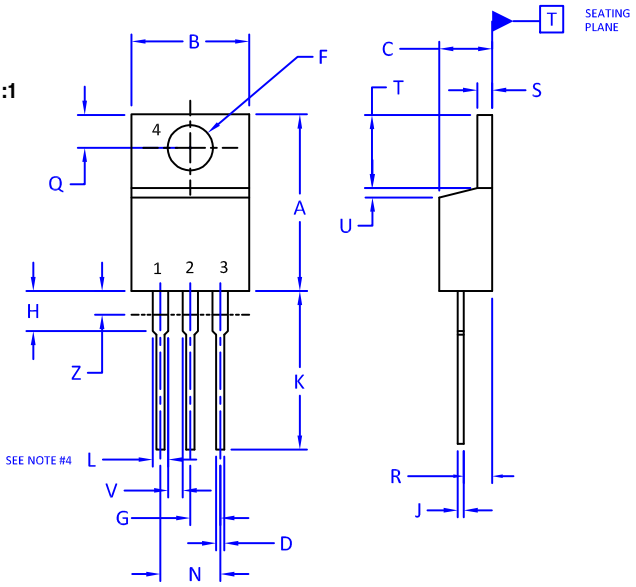
PACKAGE DIMENSIONS



SCALE 1:1

TO−220
CASE 221A
ISSUE AK

DATE 13 JAN 2022



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

	INCHES		MILLIMETERS	
DIM	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.41
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	----	1.15	---
Z	----	0.080	---	2.04

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. BASE
2. EMITTER
3. COLLECTOR
4. EMITTER

STYLE 3:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 4:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

STYLE 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:
PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:
PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

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