

# MJL0281A (NPN) MJL0302A (PNP)

Preferred Devices

## Complementary NPN-PNP Power Bipolar Transistors

These complementary devices are lower power versions of the popular MJL3281A and MJL1302A audio output transistors. With superior gain linearity and safe operating area performance, these transistors are ideal for high fidelity audio amplifier output stages and other linear applications.

### Features

- Exceptional Safe Operating Area
- NPN/PNP Gain Matching within 10% from 50 mA to 3.0 A
- Excellent Gain Linearity
- High BVCEO
- High Frequency
- Pb-Free Packages are Available\*

### Benefits

- Reliable Performance at Higher Powers
- Symmetrical Characteristics in Complementary Configurations
- Accurate Reproduction of Input Signal
- Greater Dynamic Range
- High Amplifier Bandwidth

### Applications

- High-End Consumer Audio Products
  - ◆ Home Amplifiers
  - ◆ Home Receivers
- Professional Audio Amplifiers
  - ◆ Theater and Stadium Sound Systems
  - ◆ Public Address Systems (PAs)

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	260	Vdc
Collector-Base Voltage	$V_{CBO}$	260	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc
Collector-Emitter Voltage - 1.5 V	$V_{CEX}$	260	Vdc
Collector Current - Continuous - Peak (Note 1)	$I_C$	15 30	Adc
Base Current - Continuous	$I_B$	1.5	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	180	Watts
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

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.

1. Pulse Test: Pulse Width = 5.0 ms, Duty Cycle < 10%.

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

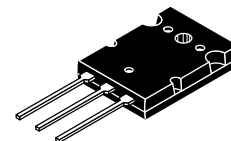


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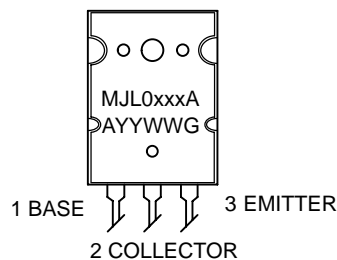
<http://onsemi.com>

**15 AMPERES  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
260 VOLTS - 180 WATTS**

TO-264  
CASE 340G  
STYLE 2



### MARKING DIAGRAM



MJL0xxxA = Device Code  
xxx = 281 or 302  
A = Location Code  
YY = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
MJL0281A	TO-264	25 Units/Rail
MJL0281AG	TO-264 (Pb-Free)	25 Units/Rail
MJL0302A	TO-264	25 Units/Rail
MJL0302AG	TO-264 (Pb-Free)	25 Units/Rail

Preferred devices are recommended choices for future use and best overall value.

# MJL0281A (NPN) MJL0302A (PNP)

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.69	$^{\circ}C/W$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage ( $I_C = 30\text{ mA}$ , $I_B = 0$ )	$V_{CEO(sus)}$	260	–	V
Collector Cutoff Current ( $V_{CB} = 260\text{ V}$ , $I_E = 0$ )	$I_{CBO}$	–	10	$\mu A$
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )	$I_{EBO}$	–	5.0	$\mu A$

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 0.5\text{ A}$ , $V_{CE} = 5.0\text{ V}$ ) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ ) ( $I_C = 3.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )	$h_{FE}$	75 75 75	150 150 150	–
Collector-Emitter Saturation Voltage ( $I_C = 5.0\text{ A}$ , $I_B = 0.5\text{ A}$ )	$V_{CE(sat)}$	–	1.0	V
Base-Emitter On Voltage ( $I_C = 5.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )	$V_{BE(on)}$	–	1.2	V

### DYNAMIC CHARACTERISTICS

Current-Gain – Bandwidth Product ( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ , $f_{test} = 1.0\text{ MHz}$ )	$f_T$	30	–	MHz
Output Capacitance ( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f_{test} = 1.0\text{ MHz}$ )	$C_{ob}$	–	400	pF

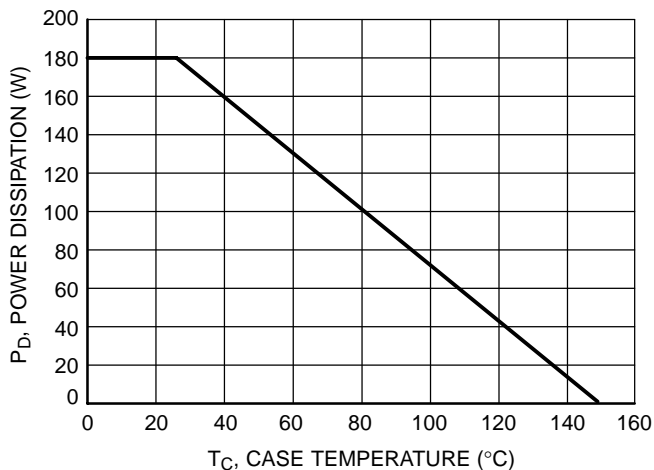


Figure 1. Power Derating

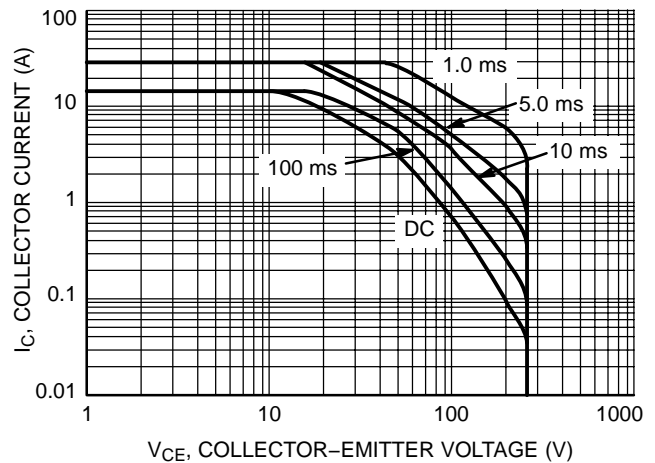


Figure 2. Safe Operating Area

# MJL0281A (NPN) MJL0302A (PNP)

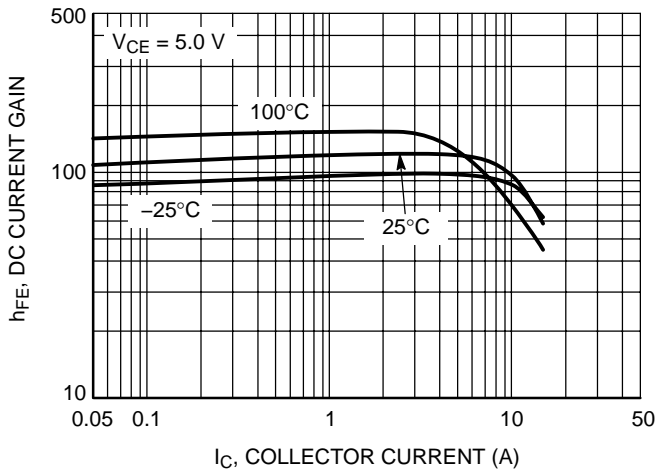


Figure 3. MJL0281A DC Current Gain

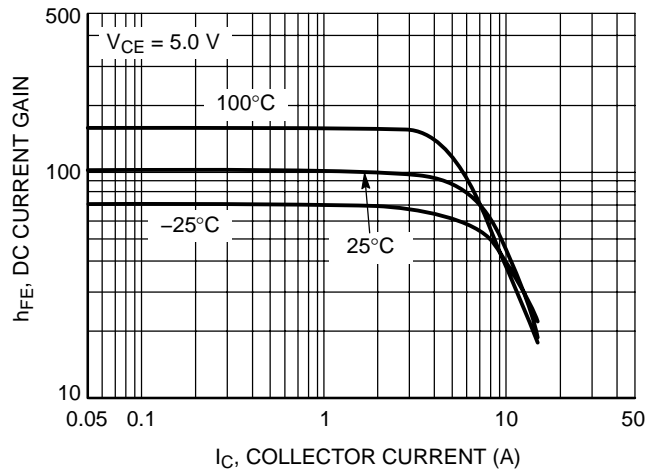


Figure 4. MJL0302A DC Current Gain

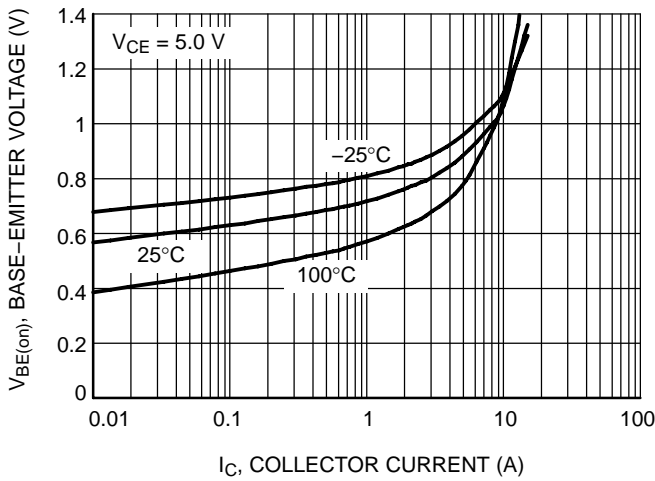


Figure 5. MJL0281A Base-Emitter Voltage

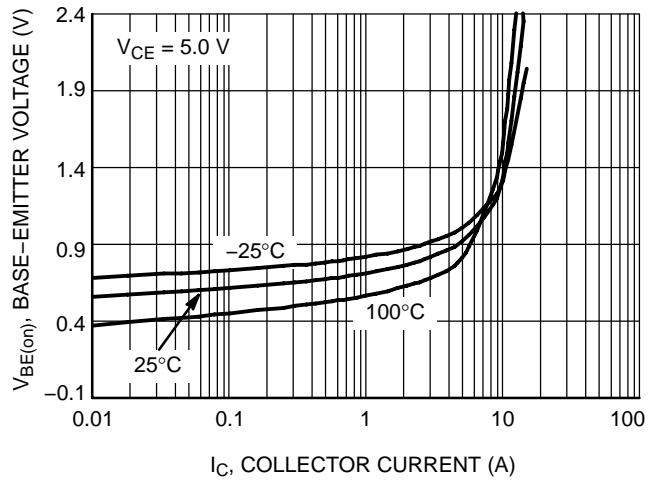


Figure 6. MJL0302A Base-Emitter Voltage

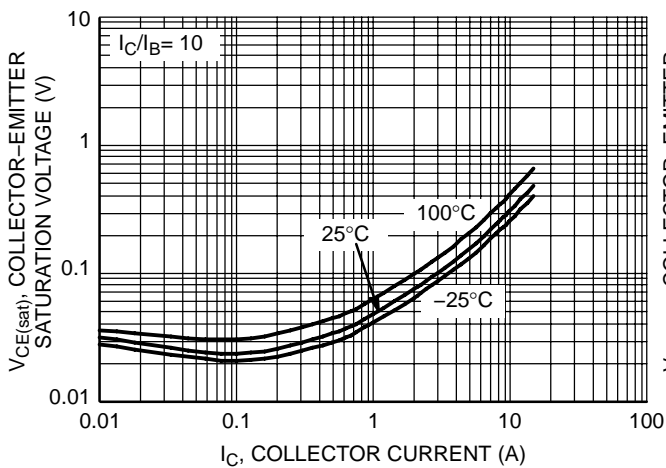


Figure 7. MJL0281A Saturation Voltage

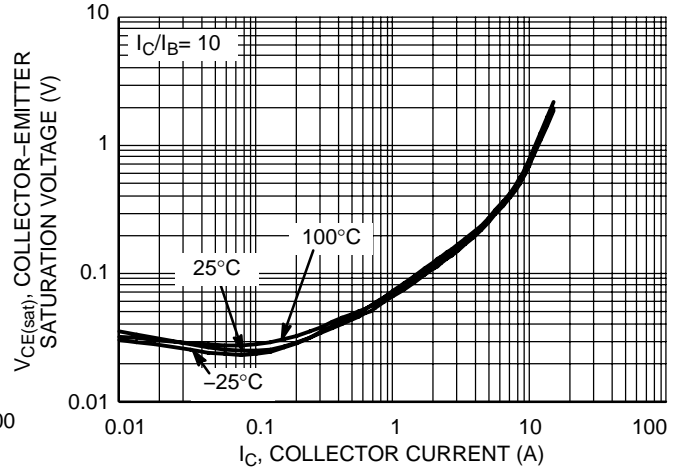
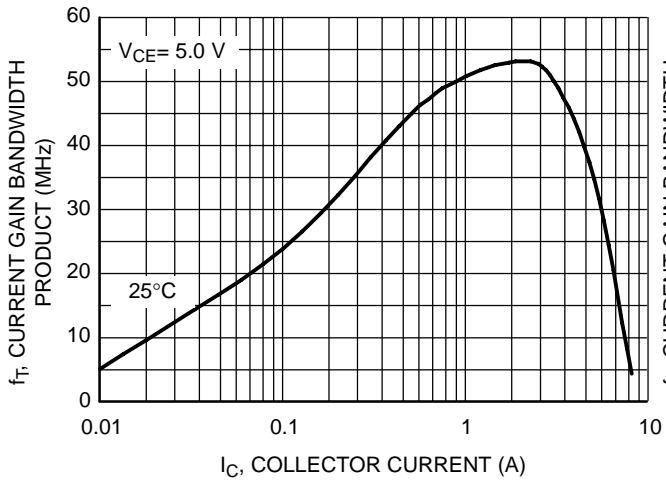
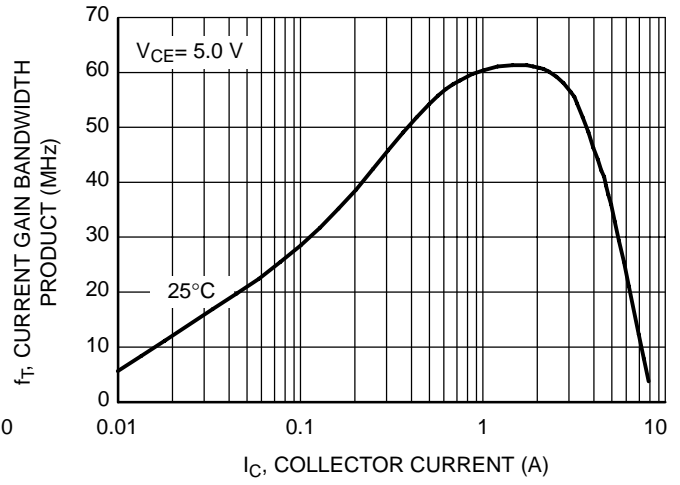


Figure 8. MJL0302A Saturation Voltage

# MJL0281A (NPN) MJL0302A (PNP)



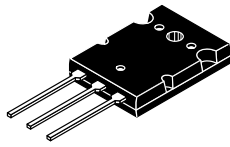
**Figure 9. MJL0281A Current Gain Bandwidth Product**



**Figure 10. MJL0302A Current Gain Bandwidth Product**

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

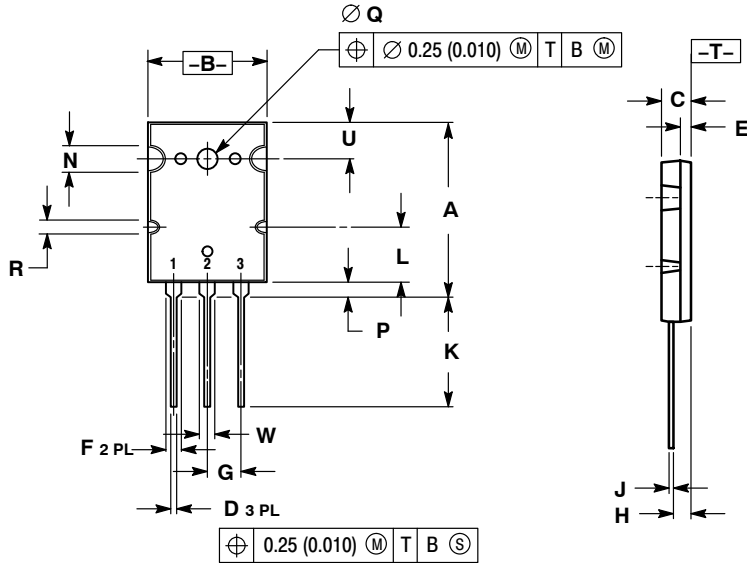
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**TO-3BPL (TO-264)**  
CASE 340G-02  
ISSUE J

DATE 17 DEC 2004

SCALE 1:2

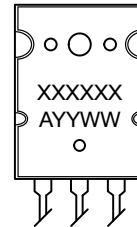


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	28.0	29.0	1.102	1.142
B	19.3	20.3	0.760	0.800
C	4.7	5.3	0.185	0.209
D	0.93	1.48	0.037	0.058
E	1.9	2.1	0.075	0.083
F	2.2	2.4	0.087	0.102
G	5.45 BSC		0.215 BSC	
H	2.6	3.0	0.102	0.118
J	0.43	0.78	0.017	0.031
K	17.6	18.8	0.693	0.740
L	11.2 REF		0.411 REF	
N	4.35 REF		0.172 REF	
P	2.2	2.6	0.087	0.102
Q	3.1	3.5	0.122	0.137
R	2.25 REF		0.089 REF	
U	6.3 REF		0.248 REF	
W	2.8	3.2	0.110	0.125

### GENERIC MARKING DIAGRAM\*

- |  |   |  |  |   |
|--|---|--|--|---|
| STYLE 1:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE | STYLE 2:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER | STYLE 3:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN | STYLE 4:<br>PIN 1. DRAIN<br>2. SOURCE<br>3. GATE | STYLE 5:<br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER |
|--|---|--|--|---|



- XXXXXX = Specific Device Code  
A = Location Code  
YY = Year  
WW = Work Week

\*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.

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