

# MJL4281A (NPN) MJL4302A (PNP)

## Complementary NPN-PNP Silicon Power Bipolar Transistors

The MJL4281A and MJL4302A are power transistors for high power audio.

### Features

- 350 V Collector–Emitter Sustaining Voltage
- Gain Complementary:
  - Gain Linearity from 100 mA to 5 A
  - High Gain – 80 to 240
  - $h_{FE} = 50$  (min) @  $I_C = 8$  A
- Low Harmonic Distortion
- High Safe Operation Area – 1.0 A/100 V @ 1 Second
- High  $f_T$
- Pb–Free Packages are Available\*

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

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	350	Vdc
Collector–Base Voltage	$V_{CBO}$	350	Vdc
Emitter–Base Voltage	$V_{EBO}$	5.0	Vdc
Collector–Emitter Voltage – 1.5 V	$V_{CEX}$	350	Vdc
Collector Current – Continuous – Peak (Note 1)	$I_C$	15 30	Adc
Base Current – Continuous	$I_B$	1.5	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	230 1.84	W $^\circ\text{C/W}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–65 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	0.54	$^\circ\text{C/W}$

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 ms, Duty Cycle < 10%.

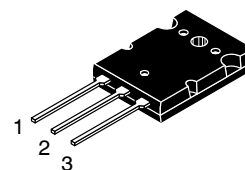
\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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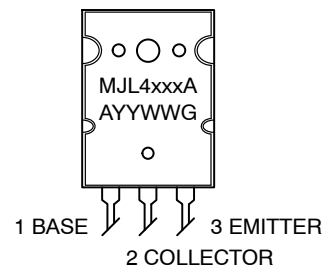
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**15 AMPERES  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
350 VOLTS, 230 WATTS**



TO-264  
CASE 340G  
STYLE 2

### MARKING DIAGRAM



xxx = 281 or 302  
A = Assembly Location  
YY = Year  
WW = Work Week  
G = Pb–Free Package

### ORDERING INFORMATION

Device	Package	Shipping
MJL4281A	TO-264	25 Units/Rail
MJL4281AG	TO-264 (Pb–Free)	25 Units/Rail
MJL4302A	TO-264	25 Units/Rail
MJL4302AG	TO-264 (Pb–Free)	25 Units/Rail

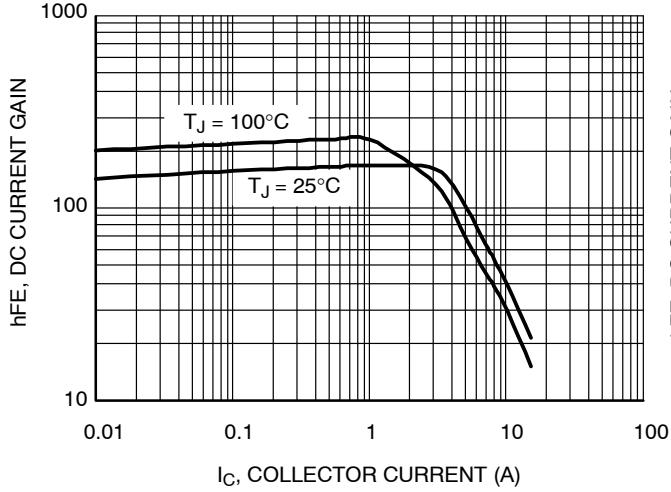
## MJL4281A (NPN) MJL4302A (PNP)

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

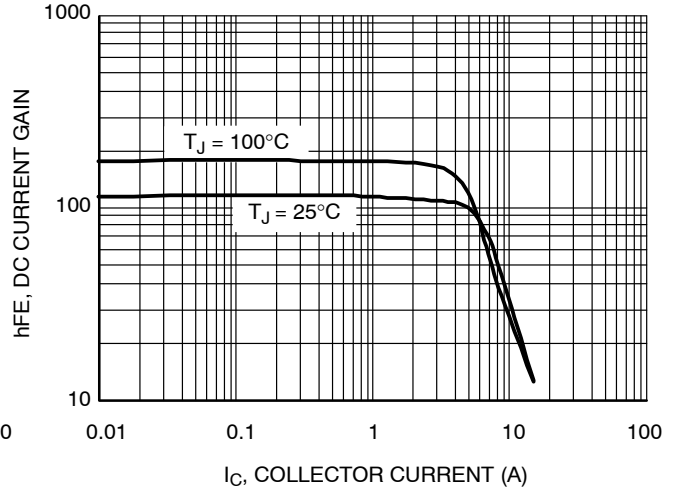
Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector Emitter Sustaining Voltage (I <sub>C</sub> = 50 mA, I <sub>B</sub> = 0)	V <sub>CE(sus)</sub>	350		Vdc
Collector Cut-off Current (V <sub>CE</sub> = 200 V, I <sub>B</sub> = 0)	I <sub>CEO</sub>		100	μAdc
Collector Cutoff Current (V <sub>CB</sub> = 350 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	-	50	μAdc
Emitter Cutoff Current (V <sub>EB</sub> = 5.0 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	-	5.0	μAdc
<b>SECOND BREAKDOWN</b>				
Second Breakdown Collector with Base Forward Biased (V <sub>CE</sub> = 50 Vdc, t = 1.0 s (non-repetitive) (V <sub>CE</sub> = 100 Vdc, t = 1.0 s (non-repetitive)	I <sub>S/b</sub>	4.5 1.0	- -	Adc
<b>ON CHARACTERISTICS</b>				
DC Current Gain (I <sub>C</sub> = 100 mAdc, V <sub>CE</sub> = 5.0 Vdc) (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 5.0 Vdc) (I <sub>C</sub> = 3.0 Adc, V <sub>CE</sub> = 5.0 Vdc) (I <sub>C</sub> = 5.0 Adc, V <sub>CE</sub> = 5.0 Vdc) (I <sub>C</sub> = 8.0 Adc, V <sub>CE</sub> = 5.0 Vdc) (I <sub>C</sub> = 15 Adc, V <sub>CE</sub> = 5.0 Vdc)	h <sub>FE</sub>	80 80 80 80 50 10	250 250 250 250 - -	-
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.8 Adc)	V <sub>CE(sat)</sub>	-	1.0	Vdc
Emitter-Base Saturation Voltage (I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.8 A)	V <sub>BE(sat)</sub>	-	1.4	Vdc
Base-Emitter ON Voltage (I <sub>C</sub> = 8.0 Adc, V <sub>CE</sub> = 5.0 Vdc)	V <sub>BE(on)</sub>	-	1.5	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Current-Gain - Bandwidth Product (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 5.0 Vdc, f <sub>test</sub> = 1.0 MHz)	f <sub>T</sub>	35	-	MHz
Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f <sub>test</sub> = 1.0 MHz)	C <sub>ob</sub>	-	600	pF

# MJL4281A (NPN) MJL4302A (PNP)

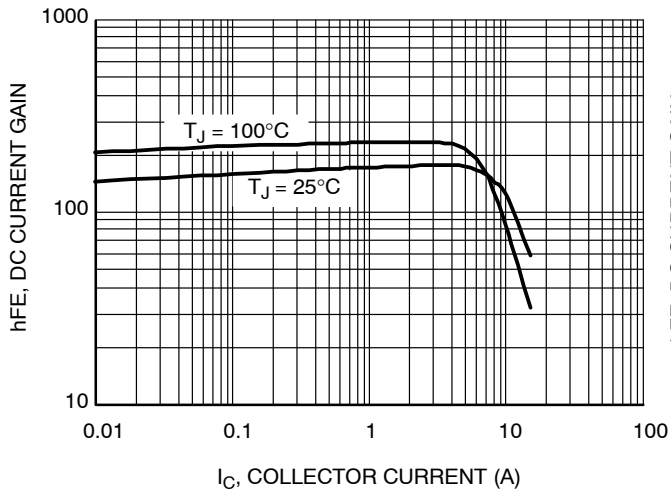
## TYPICAL CHARACTERISTICS



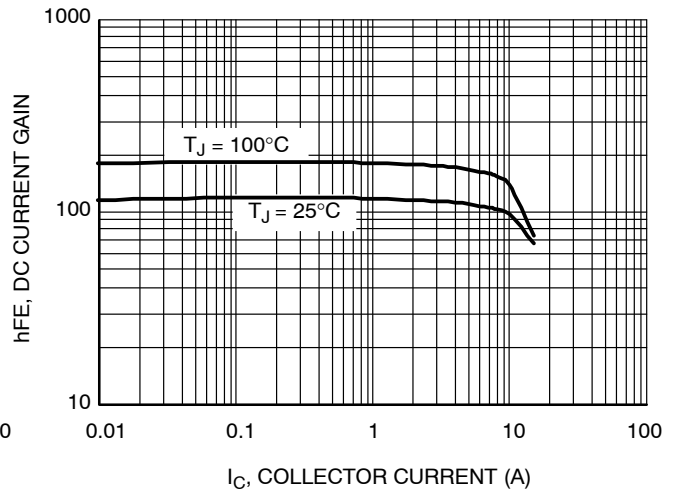
**Figure 1. DC Current Gain,  $V_{CE} = 5\text{ V}$ ,  
NPN MJL4281A**



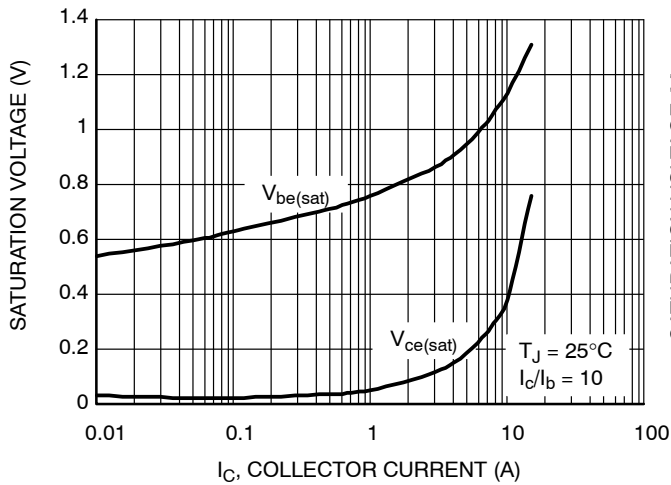
**Figure 2. DC Current Gain,  $V_{CE} = 5\text{ V}$ ,  
PNP MJL4302A**



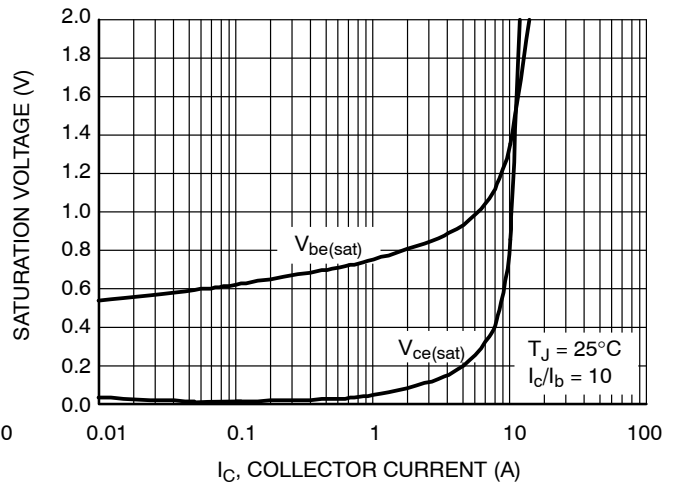
**Figure 3. DC Current Gain,  $V_{CE} = 20\text{ V}$ ,  
NPN MJL4281A**



**Figure 4. DC Current Gain,  $V_{CE} = 20\text{ V}$ ,  
PNP MJL4302A**



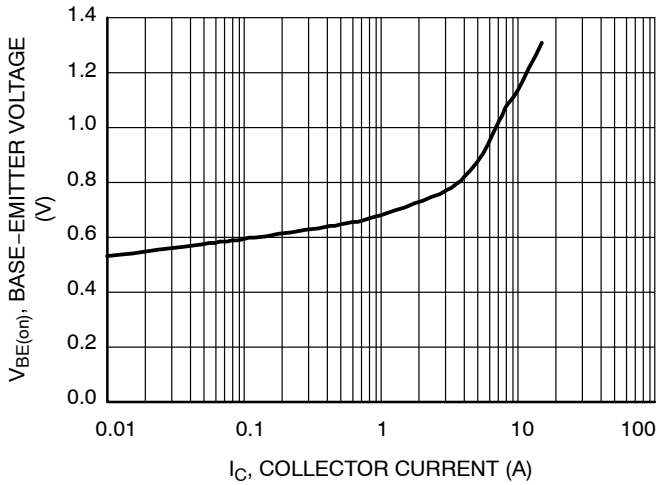
**Figure 5. Typical Saturation Voltage,  
NPN MJL4281A**



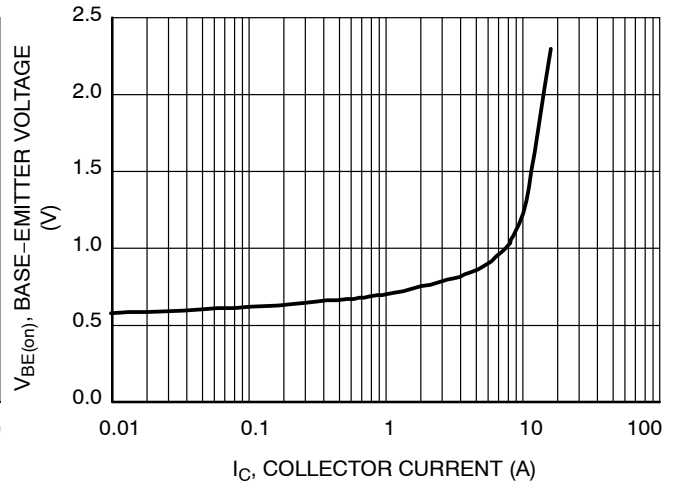
**Figure 6. Typical Saturation Voltage,  
PNP MJL4302A**

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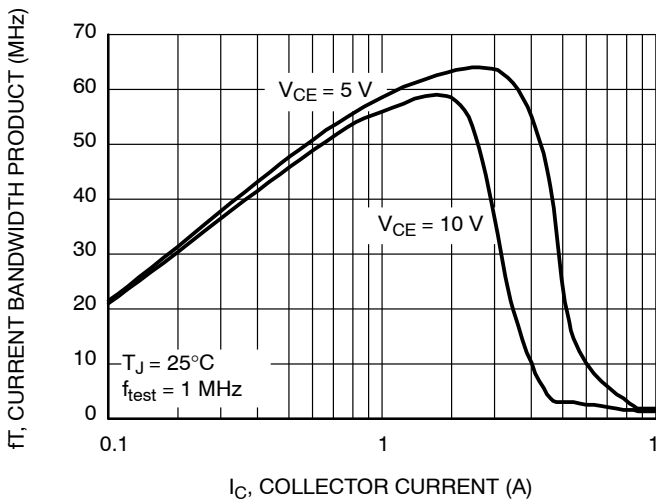
## TYPICAL CHARACTERISTICS



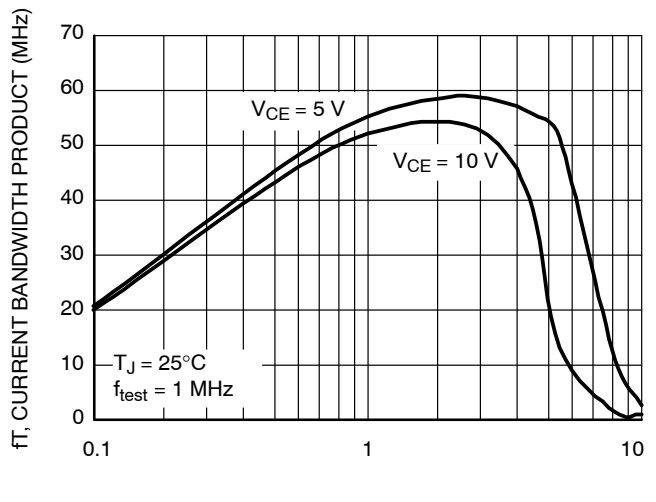
**Figure 7. Typical Base-Emitter Voltages, NPN MJL4281A**



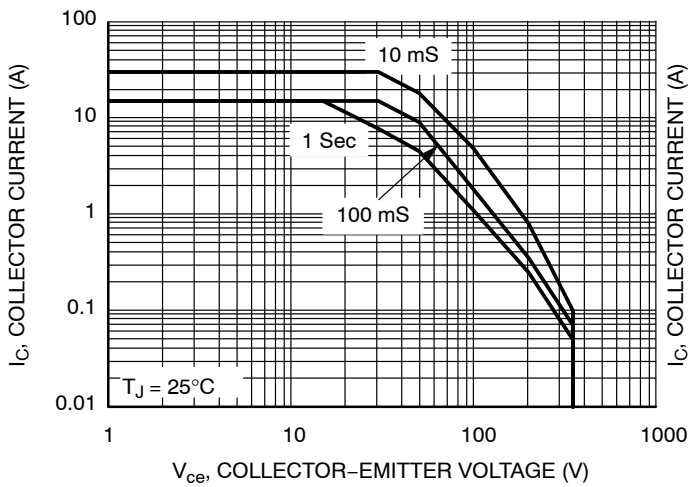
**Figure 8. Typical Base-Emitter Voltages, PNP MJL4302A**



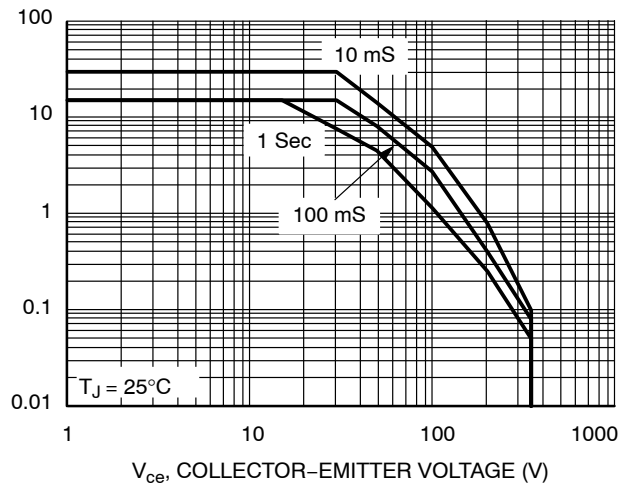
**Figure 9. Typical Current Gain Bandwidth Product, NPN MJL4281A**



**Figure 10. Typical Current Gain Bandwidth Product, PNP MJL4302A**



**Figure 11. Active Region Safe Operating Area, NPN MJL4281A**

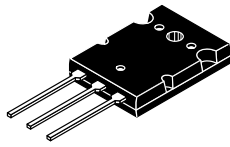


**Figure 12. Active Region Safe Operating Area, PNP MJL4302A**

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

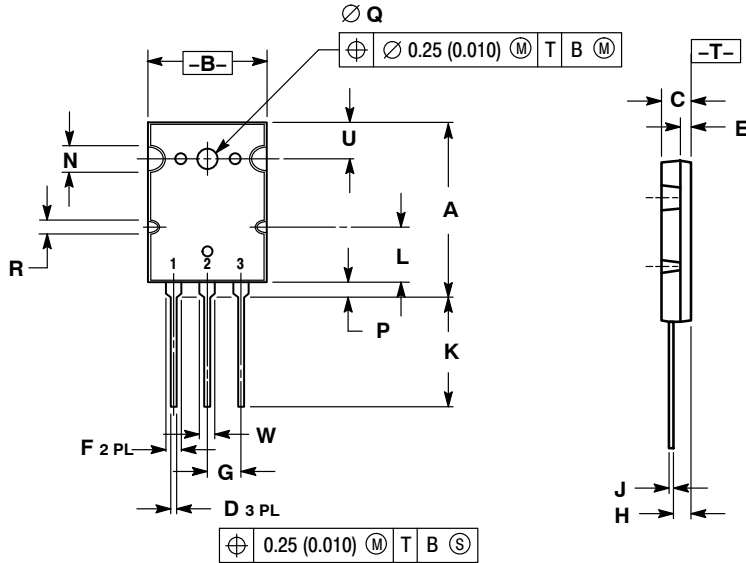
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TO-3BPL (TO-264)  
CASE 340G-02  
ISSUE J

DATE 17 DEC 2004

SCALE 1:2

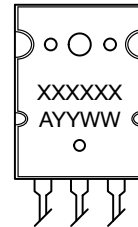


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.

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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