MJL3281A (NPN)
MJL1302A (PNP)

Preferred Devices

Complementary NPN-PNP Silicon Power Bipolar Transistors

The MJL3281A and MJL1302A are PowerBase™ power transistors for high power audio, disk head positioners and other linear applications.

- Designed for 100 W Audio Frequency
- Gain Complementary:
  Gain Linearity from 100 mA to 7 A
  High Gain − 60 to 175
  h_{FE} = 45 (Min) @ I_C = 8 A
- Low Harmonic Distortion
- High Safe Operation Area − 1 A/100 V @ 1 Second
- High f_T − 30 MHz Typical
- Epoxy Meets UL 94, V−0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
  Machine Model, C > 400 V

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	230	Vdc
Collector−Base Voltage	V_{CBO}	230	Vdc
Emitter−Base Voltage	V_{EBO}	7	Vdc
Collector−Emitter Voltage − 1.5 V	V_{CEX}	230	Vdc
Collector Current − Continuous − Peak (Note 1)	I_C	15 25	Adc
Base Current − Continuous	I_B	1.5	Adc
Total Power Dissipation @ T_C = 25°C Derate Above 25°C	P_D	200 1.43	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	− 65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	0.625	°C/W

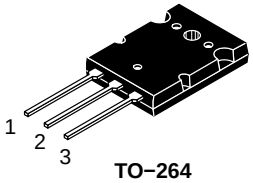
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

ON Semiconductor®

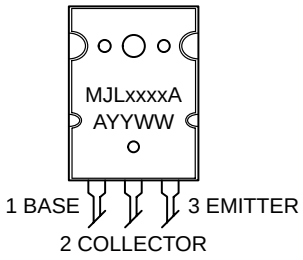
http://onsemi.com

15 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 230 VOLTS 200 WATTS



TO−264
CASE 340G
STYLE 2

MARKING DIAGRAM



xxxx = 3281 or 1302
A = Location Code
YY = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
MJL3281A	TO−264	30 Units/Rail
MJL1302A	TO−264	30 Units/Rail

†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.

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

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Sustaining Voltage (I_C = 100 mAdc, I_B = 0)	$V_{CEO(sus)}$	230	–	–	Vdc
Emitter−Base Voltage (I_E = 100 μAdc, I_C = 0)	V_{EBO}	7	–	–	Vdc
Collector Cutoff Current (V_{CB} = 230 Vdc, I_E = 0)	I_{CBO}	–	–	50	μAdc
Emitter Cutoff Current (V_{EB} = 5 Vdc, I_C = 0)	I_{EBO}	–	–	5	μAdc
Emitter Cutoff Current (V_{EB} = 7 Vdc, I_C = 0)	I_{EBO}	–	–	25	μAdc
SECOND BREAKDOWN					
Second Breakdown Collector with Base Forward Biased (V_{CE} = 50 Vdc, t = 1 s (non−repetitive)) (V_{CE} = 100 Vdc, t = 1 s (non−repetitive))	$I_{S/b}$	 4 1	 – –	 – –	Adc
ON CHARACTERISTICS					
DC Current Gain (I_C = 100 mAdc, V_{CE} = 5 Vdc) (I_C = 1 Adc, V_{CE} = 5 Vdc) (I_C = 3 Adc, V_{CE} = 5 Vdc) (I_C = 5 Adc, V_{CE} = 5 Vdc) (I_C = 7 Adc, V_{CE} = 5 Vdc) (I_C = 8 Adc, V_{CE} = 5 Vdc) (I_C = 15 Adc, V_{CE} = 5 Vdc)	h_{FE}	 60 60 60 60 60 45 12	 125 – – – 115 – 35	 175 175 175 175 175 – –	
Collector−Emitter Saturation Voltage (I_C = 10 Adc, I_B = 1 Adc)	$V_{CE(sat)}$	–	–	3	Vdc
DYNAMIC CHARACTERISTICS					
Current−Gain − Bandwidth Product (I_C = 1 Adc, V_{CE} = 5 Vdc, f_{test} = 1 MHz)	f_T	–	30	–	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1 MHz)	C_{ob}	–	–	600	pF

TYPICAL CHARACTERISTICS

PNP MJL1302A

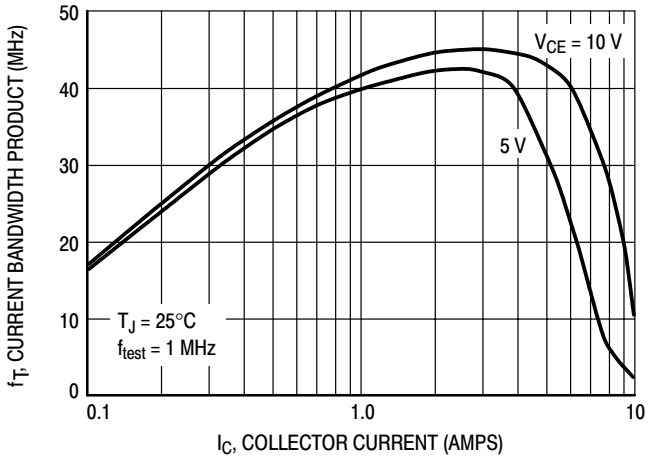


Figure 1. Typical Current Gain Bandwidth Product

NPN MJL3281A

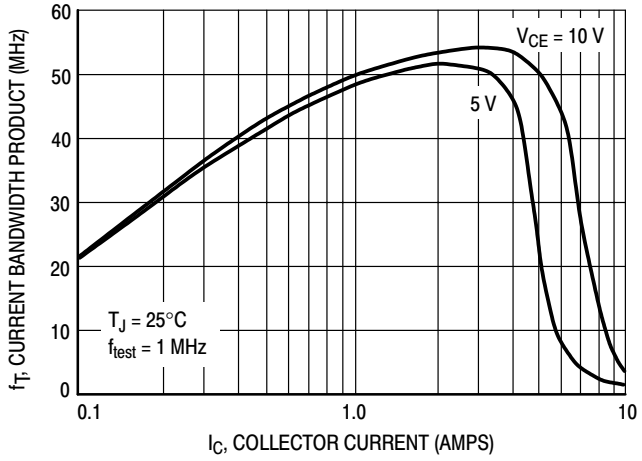


Figure 2. Typical Current Gain Bandwidth Product

PNP MJL1302A

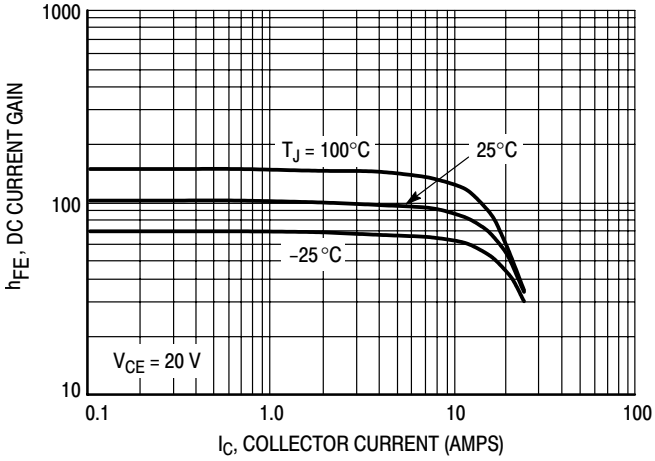


Figure 3. DC Current Gain, V_{CE} = 20 V

NPN MJL3281A

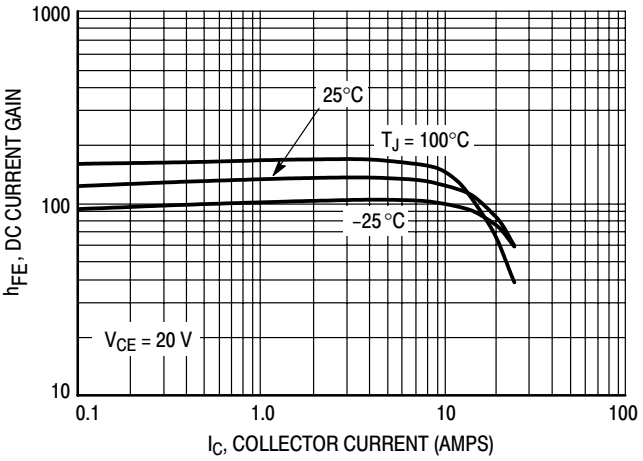


Figure 4. DC Current Gain, V_{CE} = 20 V

PNP MJL1302A

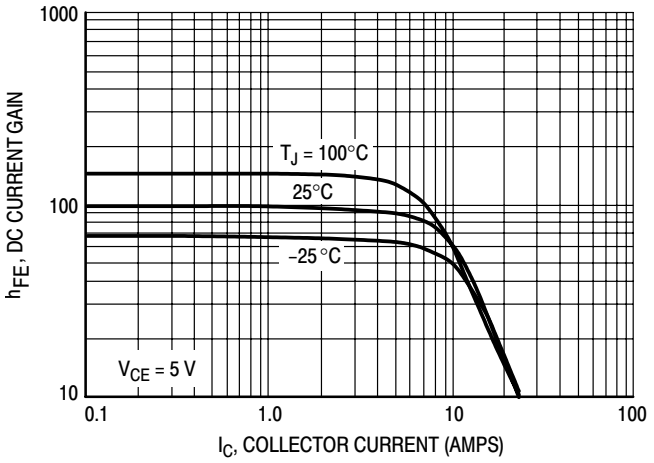


Figure 5. DC Current Gain, V_{CE} = 5 V

NPN MJL3281A

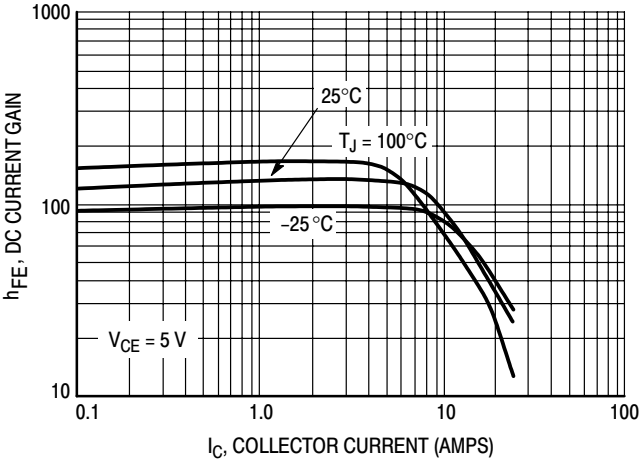


Figure 6. DC Current Gain, V_{CE} = 5 V

TYPICAL CHARACTERISTICS

PNP MJL1302A

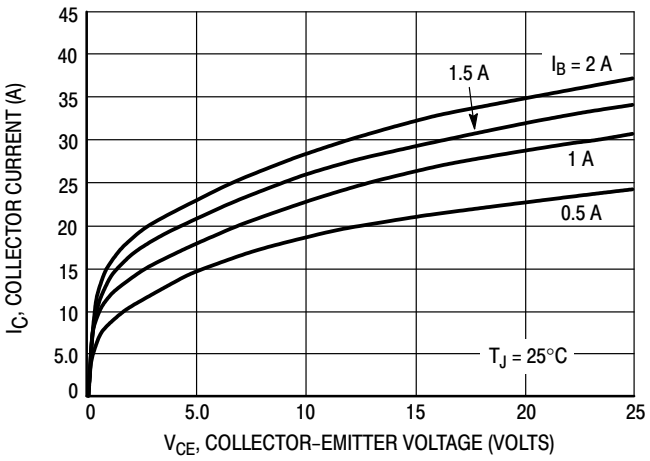


Figure 7. Typical Output Characteristics

NPN MJL3281A

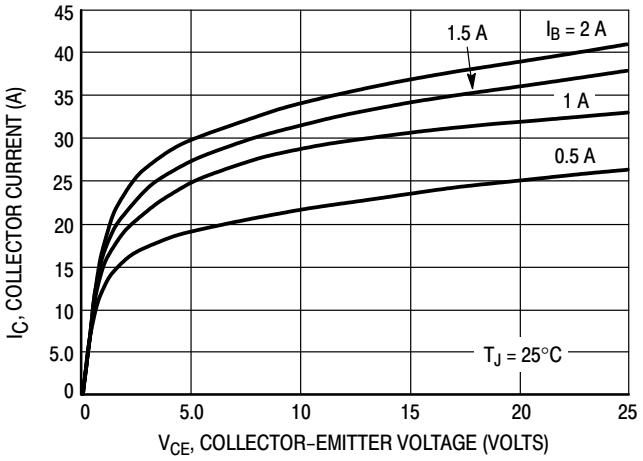


Figure 8. Typical Output Characteristics

PNP MJL1302A

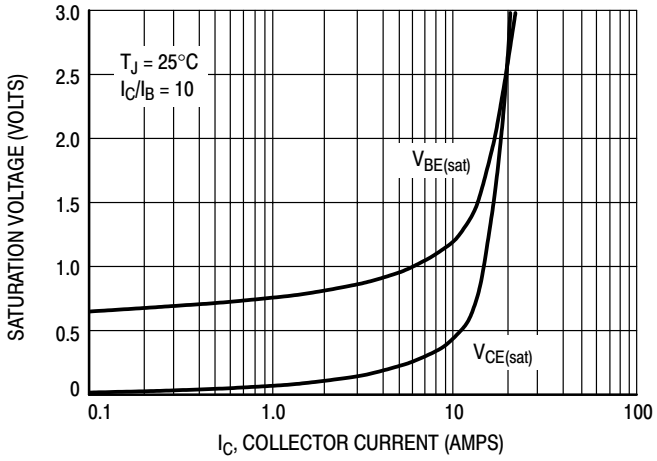


Figure 9. Typical Saturation Voltages

NPN MJL3281A

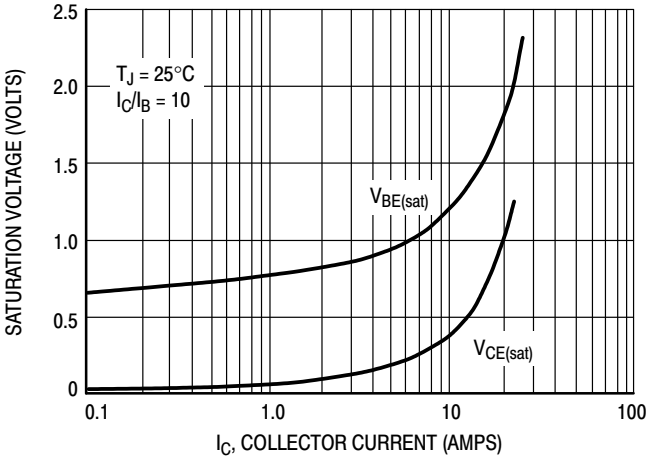


Figure 10. Typical Saturation Voltages

PNP MJL1302A

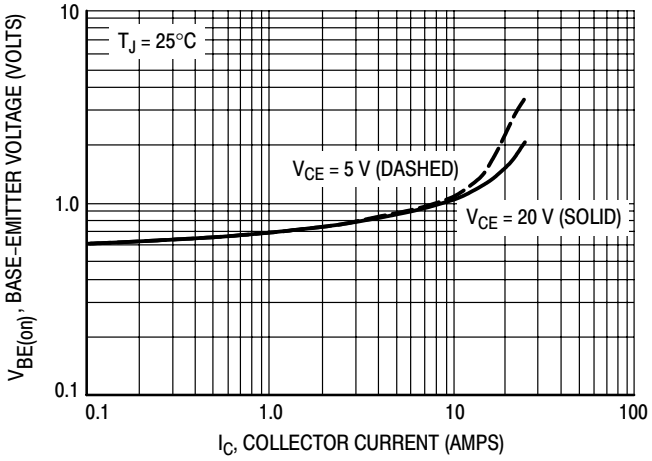


Figure 11. Typical Base−Emitter Voltage

NPN MJL3281A

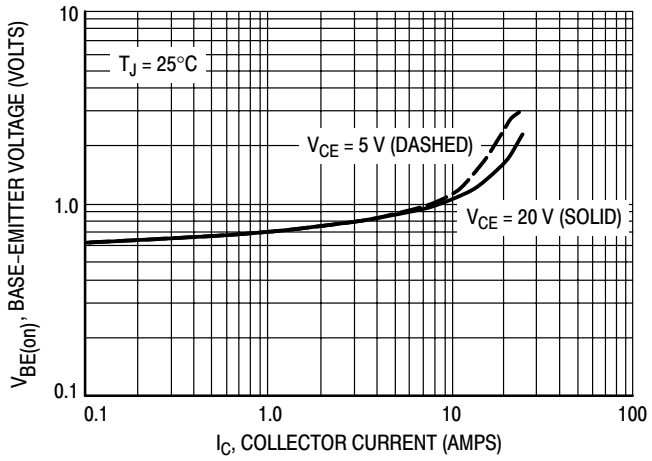


Figure 12. Typical Base−Emitter Voltage

TYPICAL CHARACTERISTICS

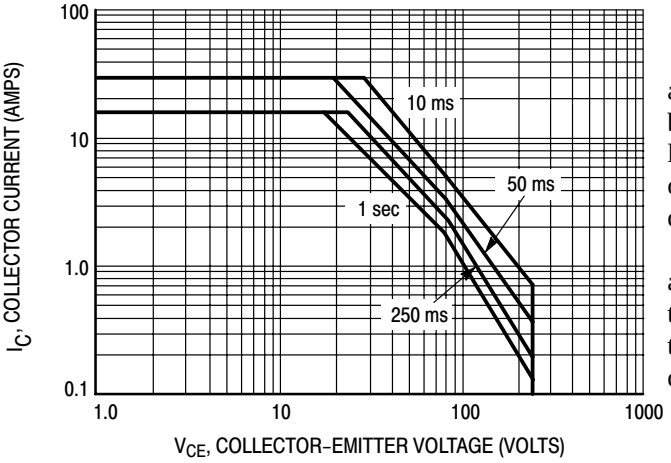


Figure 13. Active Region Safe Operating Area

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 13 is based on $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

PNP MJL1302A

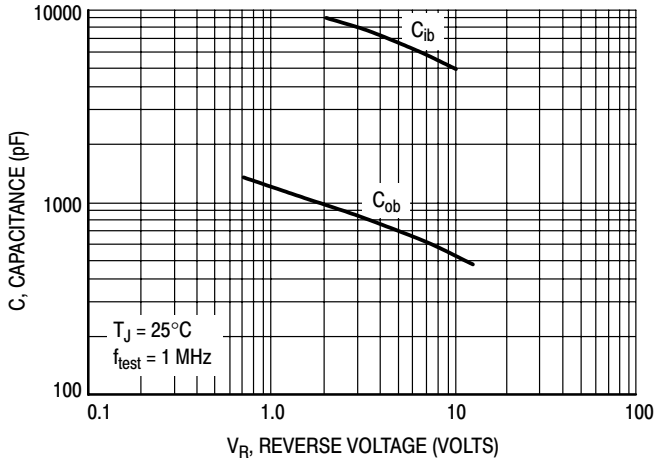


Figure 14. MJL1302A Typical Capacitance

NPN MJL3281A

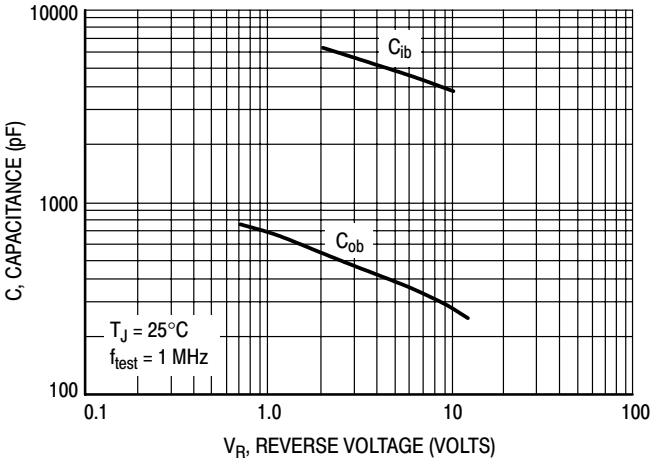
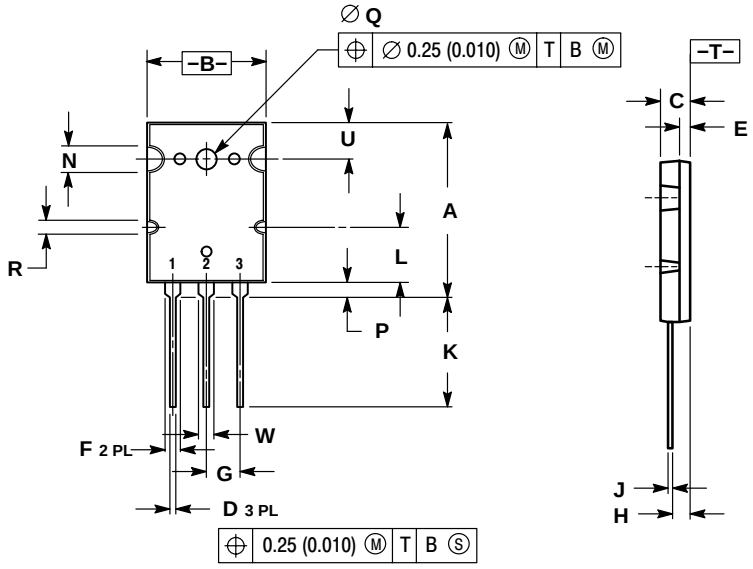


Figure 15. MJL3281A Typical Capacitance

PACKAGE DIMENSIONS

TO−3PBL (TO−264)
CASE 340G−02
ISSUE J



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

	MILLIMETERS		INCHES	
DIM	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

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

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PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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