

Complementary Silicon Power Transistors MJ15001 (NPN), MJ15002 (PNP)

The MJ15001 and MJ15002 are power transistors designed for high power audio, disk head positioners and other linear applications.

Features

- High Safe Operating Area
- For Low Distortion Complementary Designs
- High DC Current Gain
- These Devices are Pb-Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	140	Vdc
Collector-Base Voltage	V _{CBO}	140	Vdc
Emitter-Base Voltage	V _{EBO}	5	Vdc
Collector Current - Continuous	I _C	15	Adc
Base Current - Continuous	Ι _Β	5	Adc
Emitter Current - Continuous	ΙE	20	Adc
Total Power Dissipation @ T _C = 25°C Derate above 25°C	P _D	200 1.14	W W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200	°C

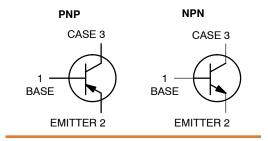
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.875	°C/W
Maximum Lead Temperature for Soldering Purposes 1/16" from Case for ≤ 10 secs	T _L	265	°C

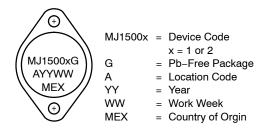
20 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 140 VOLTS, 250 WATTS

SCHEMATIC





MARKING DIAGRAM



ORDERING INFORMATION

Device	Package	Shipping [†]
MJ15001G	TO-204AA (Pb-Free)	100 Units / Tube

DISCONTINUED (Note 1)

MJ15002G	TO-204AA (Pb-Free)	100 Units / Tube

[†]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.

 DISCONTINUED: This device is not recommended for new design. Please contact your onsemi representative for information. The most current information on this device may be available on www.onsemi.com.

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

MJ15001 (NPN), MJ15002 (PNP)

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

TELEGITIONE GIAINAGE TIMOTION (16 - 25 G GINOGO GINOTWISO NOCOG)				1
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (Note 1) $(I_C, = 200 \text{ mAdc}, I_B = 0)$	V _{CEO(sus)}	140	_	Vdc
Collector Cutoff Current $(V_{CE} = 140 \text{ Vdc}, V_{BE(off)} = 1.5 \text{ Vdc})$ $(V_{CE} = 140 \text{ Vdc}, V_{BE(off)} = 1.5 \text{ Vdc}, T_C = 150^{\circ}\text{C})$	I _{CEX}	_ _	100 2.0	μAdc mAdc
Collector Cutoff Current (V _{CE} = 140 Vdc, I _B = 0)	I _{CEO}	_	250	μAdc
Emitter Cutoff Current $(V_{EB} = 5 \text{ Vdc}, I_C = 0)$	I _{EBO}	_	100	μAdc
SECOND BREAKDOWN	·			
Second Breakdown Collector Current with Base Forward Biased $(V_{CE} = 40 \text{ Vdc}, t = 1 \text{ s (non-repetitive)})$ $(V_{CE} = 100 \text{ Vdc}, t = 1 \text{ s (non-repetitive)})$	I _{S/b}	5.0 0.5	_ _	Adc
ON CHARACTERISTICS	-	•	•	
DC Current Gain (I _C = 4 Adc, V _{CE} = 2 Vdc)	h _{FE}	25	150	_
Collector–Emitter Saturation Voltage (I _C = 4 Adc, I _B = 0.4 Adc)	V _{CE(sat)}	-	1.0	Vdc
Base–Emitter On Voltage ($I_C = 4$ Adc, $V_{CE} = 2$ Vdc)	V _{BE(on)}	_	2.0	Vdc
DYNAMIC CHARACTERISTICS	•	•	•	•
Current-Gain — Bandwidth Product (I _C = 0.5 Adc, V _{CE} = 10 Vdc, f _{test} = 0.5 MHz)	f _T	2.0	-	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1 MHz)	C _{ob}	_	1000	pF

^{1.} Pulse Test: Pulse Width = 300 μ s, Duty Cycle \leq 2%.

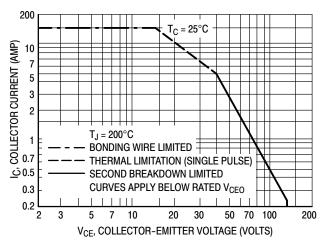


Figure 1. Active-Region Safe Operating Area

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 1 is based on $T_{J (pk)} = 200$ °C; T_{C} is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

MJ15001 (NPN), MJ15002 (PNP)

1000 700 $T_J = 25^{\circ}C$ 500 300 C_{ib} C, CAPACITANCE (pF) 200 100 70 50 C_{ob} 30 MJ15001 (NPN) MJ15002 (PNP) 20 10 70 1.5 2 3 50 100 V_R, REVERSE VOLTAGE (VOLTS)

V_R, REVERSE VOLTAGE (VOLTS) **Figure 2. Capacitances**

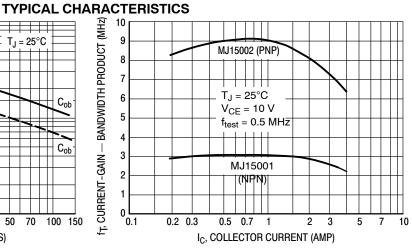
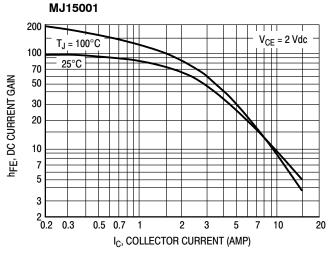


Figure 3. Current-Gain — Bandwidth Product



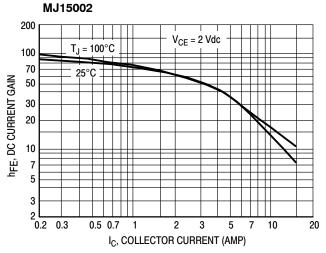
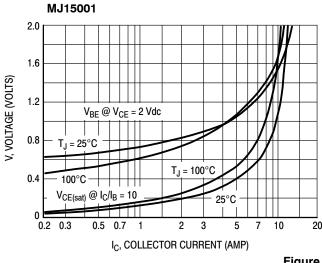


Figure 4. DC Current Gain



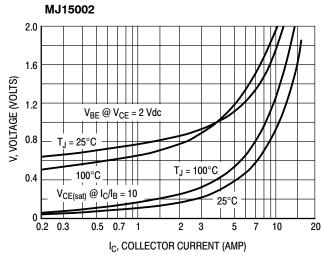
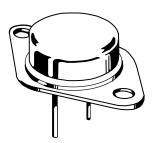


Figure 5. "On" Voltages

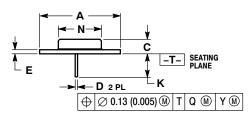


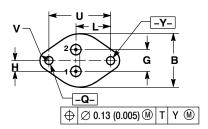


TO-204 (TO-3) CASE 1-07 ISSUE Z

DATE 10 MAR 2000

SCALE 1:1





CASE: COLLECTOR

CASE: CATHODE

NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

- 2. CONTROLLING DIMENSION: INCH.
 3. ALL RULES AND NOTES ASSOCIATED WITH
 REFERENCED TO-204AA OUTLINE SHALL APPLY.

	INCHES		MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	1.550 REF		39.37 REF	
В		1.050		26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
Е	0.055	0.070	1.40	1.77
G	0.430 BSC		10.92 BSC	
Н	0.215	BSC	5.46	BSC
K	0.440	0.480	11.18	12.19
L	0.665	BSC	16.89	BSC
N		0.830		21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
٧	0.131	0.188	3.33	4.77

STYLE 2: PIN 1. BASE 2. COLLECTOR STYLE 3: PIN 1. GATE 2. SOURCE STYLE 5: PIN 1. CATHODE 2. EXTERNAL TRIP/DELAY CASE: ANODE STYLE 4: PIN 1. GROUND 2. INPUT STYLE 1: PIN 1. BASE 2. EMITTER CASE: COLLECTOR CASE: EMITTER CASE: DRAIN CASE: OUTPUT STYLE 6: STYLE 7: STYLE 8: STYLE 9: PIN 1. CATHODE #1 2. CATHODE #2 PIN 1. GATE 2. EMITTER PIN 1. ANODE 2. OPEN PIN 1. ANODE #1 2. ANODE #2

CASE: CATHODE

CASE: ANODE

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