Preferred Device

Silicon Power Transistors

The MJ21193 (PNP) and MJ21194 (NPN) utilize Perforated Emitter technology and are specifically designed for high power audio output, disk head positioners and linear applications.

Features

- Total Harmonic Distortion Characterized
- High DC Current Gain $h_{FE} = 25$ Min @ $I_C = 8$ Adc
- Excellent Gain Linearity
- High SOA: 2.5 A, 80 V, 1 Second
- Pb–Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	250	Vdc
Collector-Base Voltage	V_{CBO}	400	Vdc
Emitter-Base Voltage	V _{EBO}	5	Vdc
Collector-Emitter Voltage - 1.5 V	V _{CEX}	400	Vdc
Collector Current – Continuous Peak (Note 1)	I _C	16 30	Adc
Base Current - Continuous	I _B	5	Adc
Total Power Dissipation @ T _C = 25°C Derate Above 25°C	P _D	250 1.43	W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	- 65 to +200	0.°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{ heta JC}$	0.7	°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 μs, Duty Cycle ≤10%. (continued)

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



ON Semiconductor®

http://onsemi.com

16 AMP COMPLEMENTARY SILICON POWER TRANSISTORS 250 VOLTS, 250 WATTS

MARKING DIAGRAM



TO-204AA (TO-3) CASE 1-07



= 3 or 4

MEXICO = Assembly Location

YY = Year WW = Work Week G = Pb-Free Package

ORDERING INFORMATION

Device	Package	Shipping [†]	
MJ21193	TO-3	100 Units / Tray	
MJ21193G	TO-3 (Pb-Free)	100 Units / Tray	
MJ21194	TO-3	100 Units / Tray	
MJ21194G	TO-3 (Pb-Free)	100 Units / Tray	

†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	Тур	Max	Unit
OFF CHARACTERISTICS	MAI TOWN COM	W	II.	•	
Collector–Emitter Sustaining Voltage (I _C = 100 mAdc, I _B = 0)	V _{CEO(sus)}	250	_	_	Vdc
Collector Cutoff Current (V _{CE} = 200 Vdc, I _B = 0)	I _{CEO}	M-TV	_	100	μAdc
Emitter Cutoff Current (V _{CE} = 5 Vdc, I _C = 0)	I _{EBO}	OM.T		100	μAdc
Collector Cutoff Current (V _{CE} = 250 Vdc, V _{BE(off)} = 1.5 Vdc)	I _{CEX}	CON	TW	100	μAdc
SECOND BREAKDOWN	WW 100		N.T.W		
Second Breakdown Collector Current with Base Forward Biased (V _{CE} = 50 Vdc, t = 1 s (non–repetitive) (V _{CE} = 80 Vdc, t = 1 s (non–repetitive)	I _{S/b}	5 2.5	MITY	N _	Adc
ON CHARACTERISTICS	MM.	ONY.C	On T	W	
DC Current Gain ($I_C = 8$ Adc, $V_{CE} = 5$ Vdc) ($I_C = 16$ Adc, $I_B = 5$ Adc)	h _{FE}	25 8	$C\bar{Q}_{M}$	75	
Base–Emitter On Voltage (I _C = 8 Adc, V _{CE} = 5 Vdc)	V _{BE(on)}	N.100	Y.CON	2.2	Vdc
Collector–Emitter Saturation Voltage ($I_C = 8$ Adc, $I_B = 0.8$ Adc) ($I_C = 16$ Adc, $I_B = 3.2$ Adc)	V _{CE} (sat)	WY.10	07.CC	1.4 4	Vdc
DYNAMIC CHARACTERISTICS	W. W.	MAN	TOOY.	702	CM
Total Harmonic Distortion at the Output V _{RMS} = 28.3 V, f = 1 kHz, P _{LOAD} = 100 W _{RMS} h _{FE}	T _{HD}	WWW	V.100Y	COA	%
	COM.TW	WAN .	0.8	V.CO	LTW
Current Gain Bandwidth Product (I _C = 1 Adc, V _{CE} = 10 Vdc, f _{test} = 1 MHz)	COMP	4	W.1	OY-CC	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1 MHz)	C _{ob}	- 1	WW.	500	pF

NOTE: Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤2%

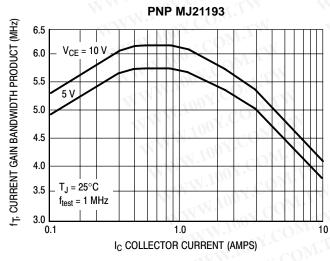


Figure 1. Typical Current Gain Bandwidth Product

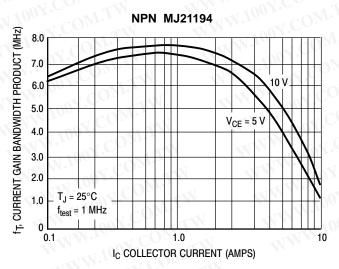


Figure 2. Typical Current Gain Bandwidth Product

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TYPICAL CHARACTERISTICS

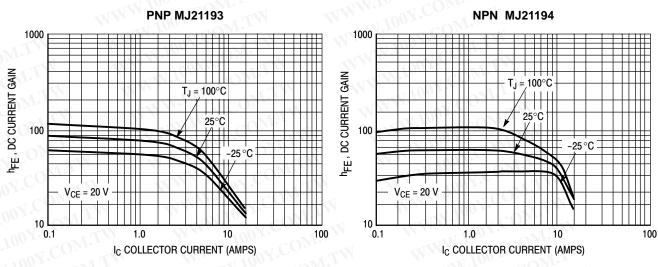


Figure 3. DC Current Gain, V_{CE} = 20 V

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

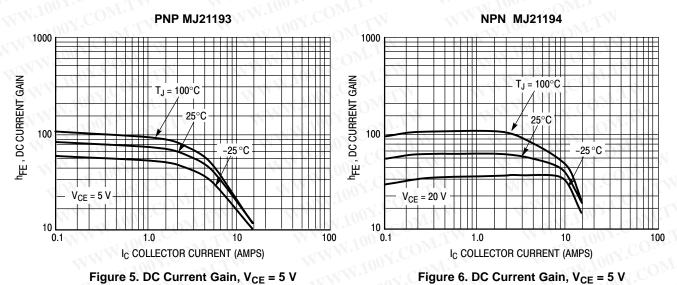


Figure 5. DC Current Gain, V_{CE} = 5 V

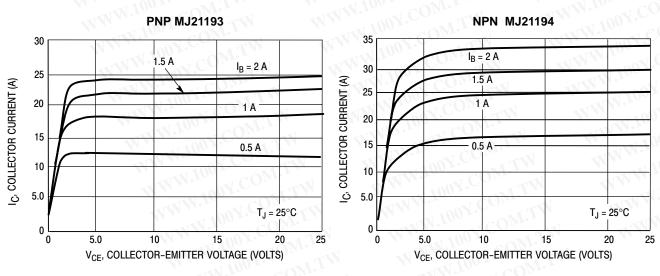


Figure 7. Typical Output Characteristics

Figure 8. Typical Output Characteristics

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TYPICAL CHARACTERISTICS

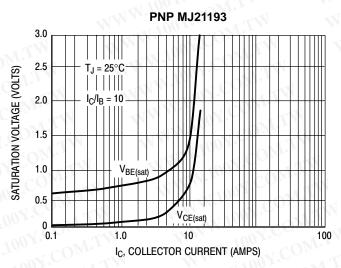


Figure 9. Typical Saturation Voltages

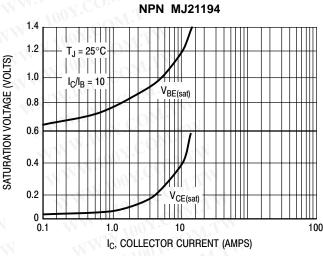


Figure 10. Typical Saturation Voltages

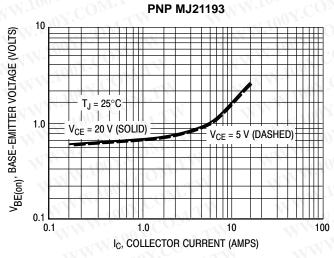


Figure 11. Typical Base-Emitter Voltage

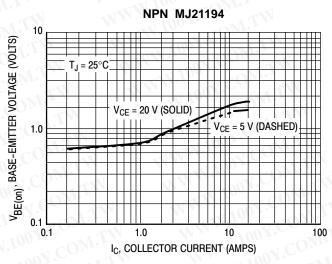


Figure 12. Typical Base-Emitter Voltage

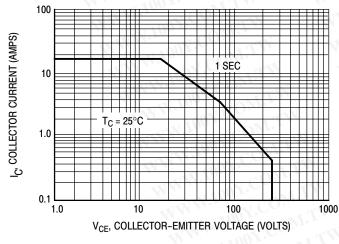


Figure 13. Active Region Safe Operating Area

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 $T_{J(pk)} = 200^{\circ}C$; 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.

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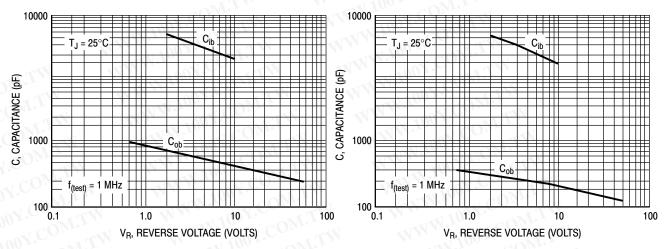


Figure 14. MJ21193 Typical Capacitance

Figure 15. MJ21194 Typical Capacitance

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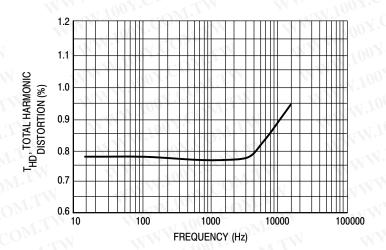


Figure 16. Typical Total Harmonic Distortion

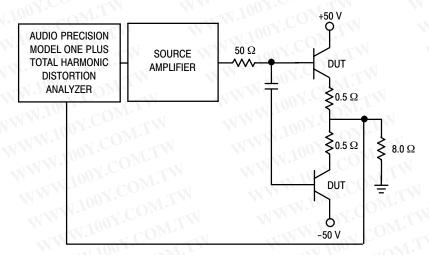
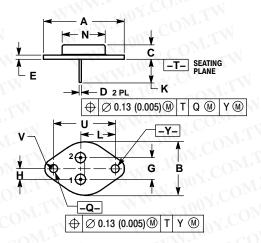


Figure 17. Total Harmonic Distortion Test Circuit

PACKAGE DIMENSIONS

TO-204AA (TO-3)

CASE 1-07 ISSUE Z



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

 - ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

A .	INCHES		INCHES MILLIMETE		
DIM	MIN	MAX	MIN	MAX	
Α	1.550 REF		39.37	REF	
В	1	1.050	1	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	02_	21.08	
Q	0.151	0.165	3.84	4.19	
U	1.187	1.187 BSC		30.15 BSC	
٧	0.131	0.188	3.33	4.77	

STYLE 1: PIN 1. BASE CASE: COLLECTOR

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