

MPSA13, MPSA14

MPSA14 is a Preferred Device

Darlington Transistors

NPN Silicon

Features

- Pb-Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	30	Vdc
Collector–Base Voltage	V_{CBO}	30	Vdc
Emitter–Base Voltage	V_{EBO}	10	Vdc
Collector Current – Continuous	I_C	500	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

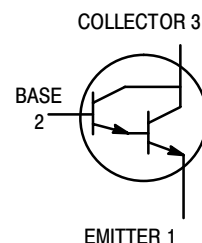
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{mW}$
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{mW}$

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.

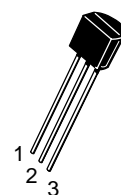


ON Semiconductor®

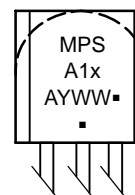
<http://onsemi.com>



MARKING DIAGRAM



TO-92
(TO-226AA)
CASE 29-11
STYLE 1



x = 3 or 4
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

*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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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 100\ \mu\text{Adc}$, $I_B = 0$)	$V_{(BR)CES}$	30	–	Vdc
Collector Cutoff Current ($V_{CB} = 30\ \text{Vdc}$, $I_E = 0$)	I_{CBO}	–	100	nAdc
Emitter Cutoff Current ($V_{EB} = 10\ \text{Vdc}$, $I_C = 0$)	I_{EBO}	–	100	nAdc

ON CHARACTERISTICS (Note 1)

DC Current Gain ($I_C = 10\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 100\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$)	MPSA13 MPSA14 MPSA13 MPSA14	h_{FE}	5,000 10,000 10,000 20,000	– – – –	–
Collector–Emitter Saturation Voltage ($I_C = 100\ \text{mAdc}$, $I_B = 0.1\ \text{mAdc}$)		$V_{CE(sat)}$	–	1.5	Vdc
Base–Emitter On Voltage ($I_C = 100\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$)		$V_{BE(on)}$	–	2.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain – Bandwidth Product (Note 2) ($I_C = 10\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$, $f = 100\ \text{MHz}$)	f_T	125	–	MHz
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1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$; Duty Cycle $\leq 2.0\%$.

2. $f_T = |h_{fe}| \cdot f_{test}$.

ORDERING INFORMATION

Device	Package	Shipping†
MPSA13	TO–92	5000 Units / Box
MPSA13G	TO–92 (Pb–Free)	5000 Units / Box
MPSA13RLRA	TO–92	2000 / Tape & Reel
MPSA13RLRAG	TO–92 (Pb–Free)	2000 / Tape & Reel
MPSA13RLRM	TO–92	2000 / Ammo Pack
MPSA13RLRMG	TO–92 (Pb–Free)	2000 / Ammo Pack
MPSA13RLRP	TO–92	2000 / Ammo Pack
MPSA13RLRPG	TO–92 (Pb–Free)	2000 / Ammo Pack
MPSA13ZL1	TO–92	2000 / Ammo Pack
MPSA13ZL1G	TO–92 (Pb–Free)	2000 / Ammo Pack
MPSA14	TO–92	5000 Units / Box
MPSA14G	TO–92 (Pb–Free)	5000 Units / Box
MPSA14RLRA	TO–92	2000 / Tape & Reel
MPSA14RLRAG	TO–92 (Pb–Free)	2000 / Tape & Reel
MPSA14RLRP	TO–92	2000 / Ammo Pack
MPSA14RLRPG	TO–92 (Pb–Free)	2000 / Ammo Pack

†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.

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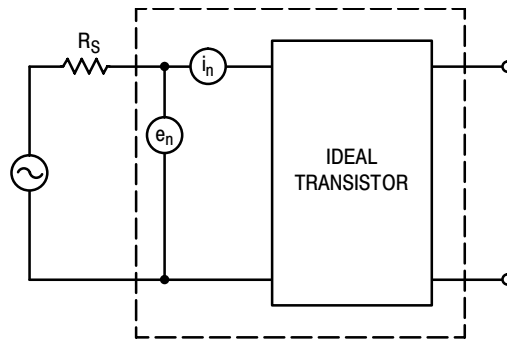


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

($V_{CE} = 5.0$ Vdc, $T_A = 25^\circ\text{C}$)

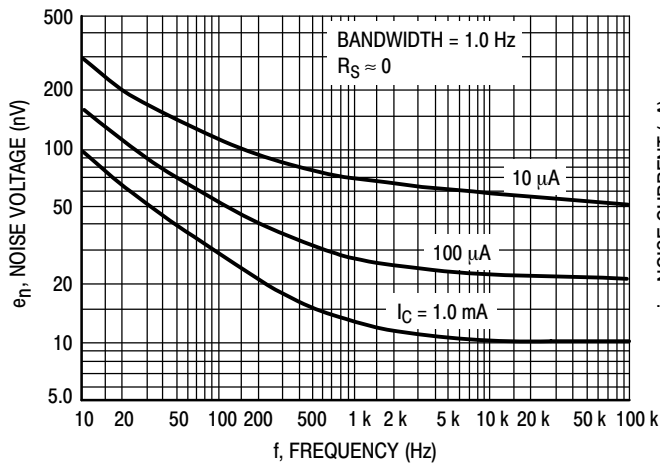


Figure 2. Noise Voltage

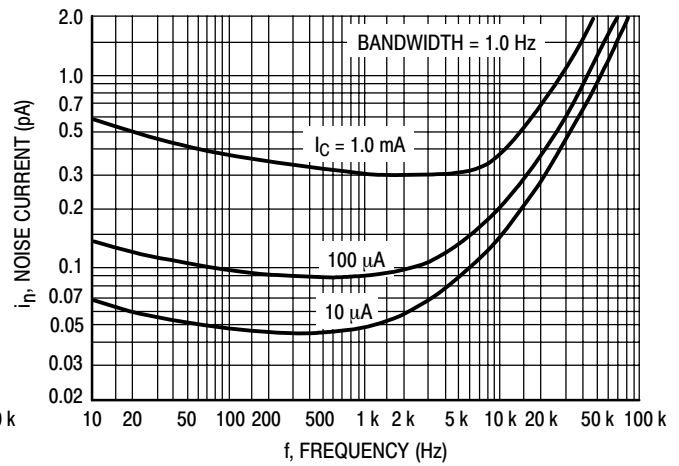


Figure 3. Noise Current

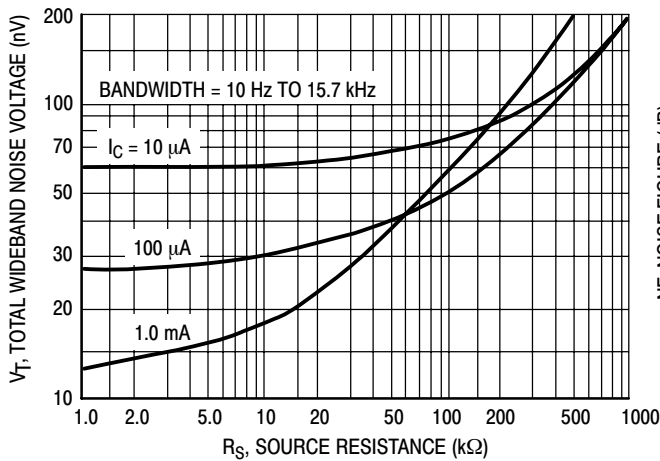


Figure 4. Total Wideband Noise Voltage

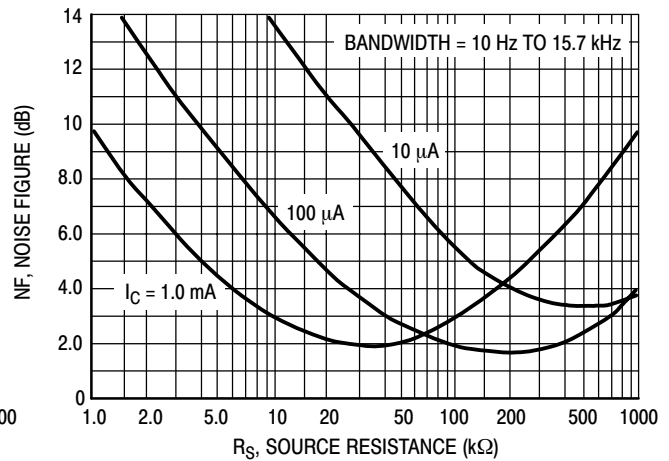


Figure 5. Wideband Noise Figure

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SMALL-SIGNAL CHARACTERISTICS

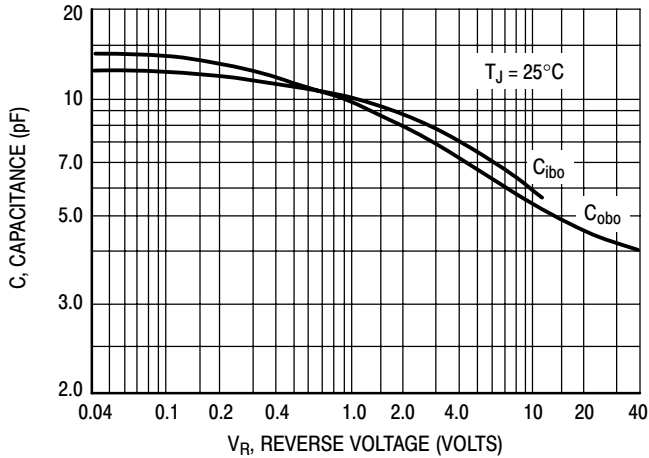


Figure 6. Capacitance

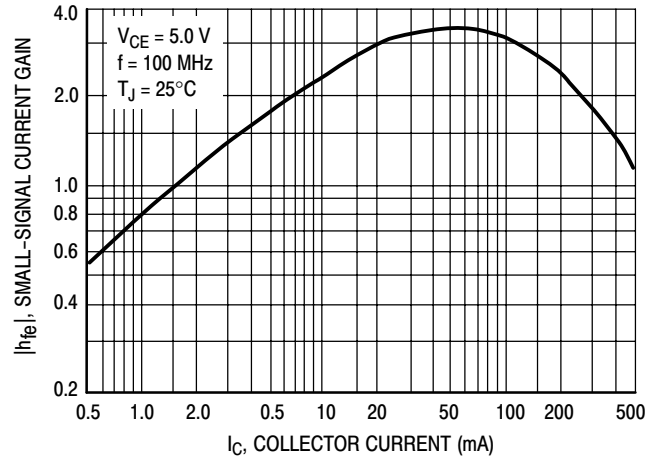


Figure 7. High Frequency Current Gain

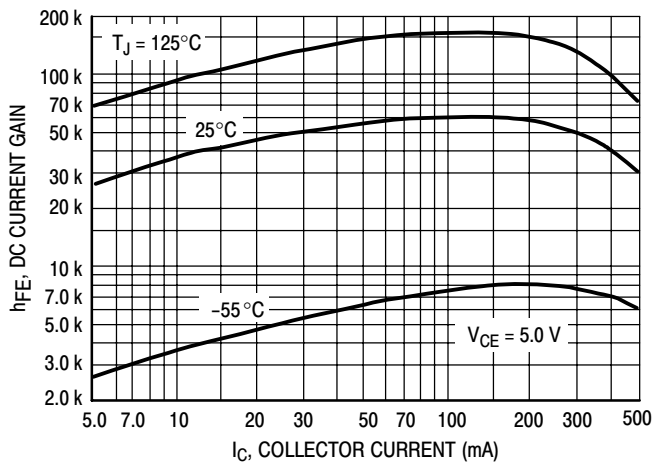


Figure 8. DC Current Gain

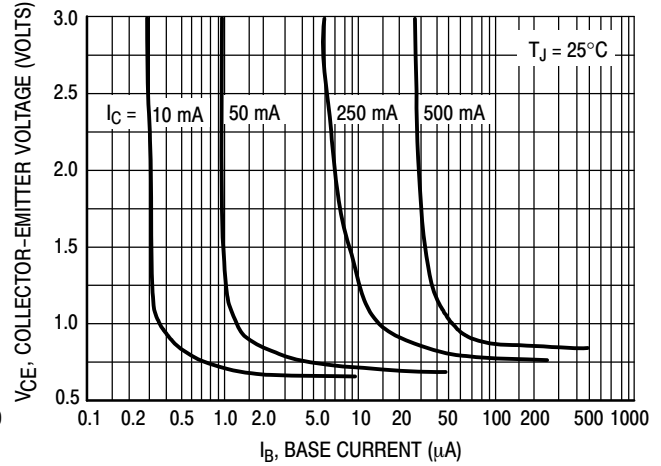


Figure 9. Collector Saturation Region

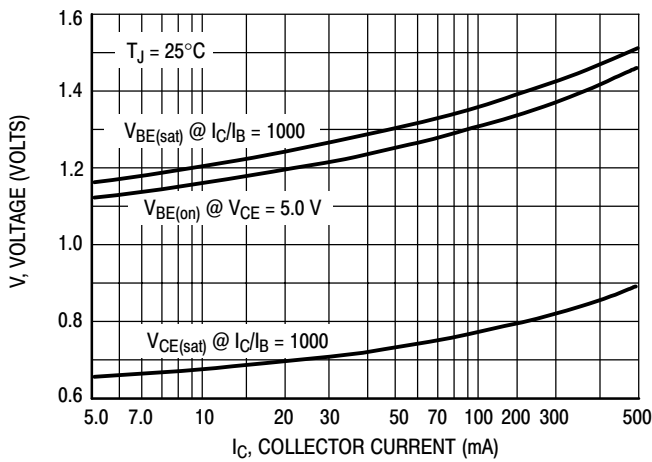


Figure 10. "On" Voltages

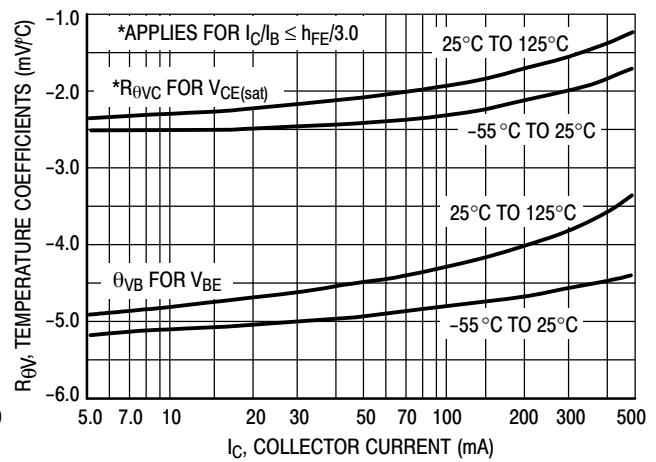


Figure 11. Temperature Coefficients

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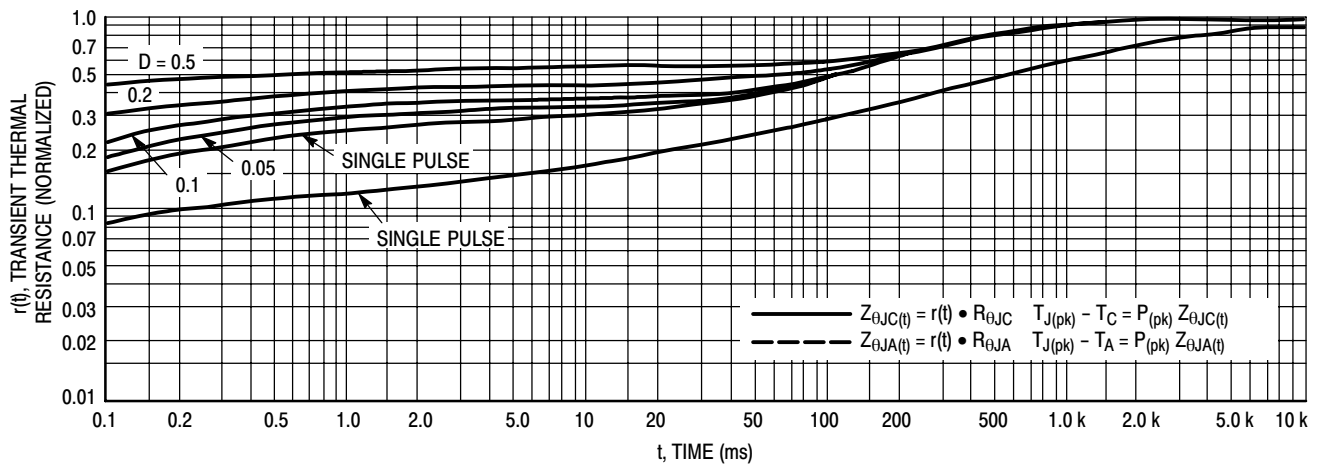


Figure 12. Thermal Response

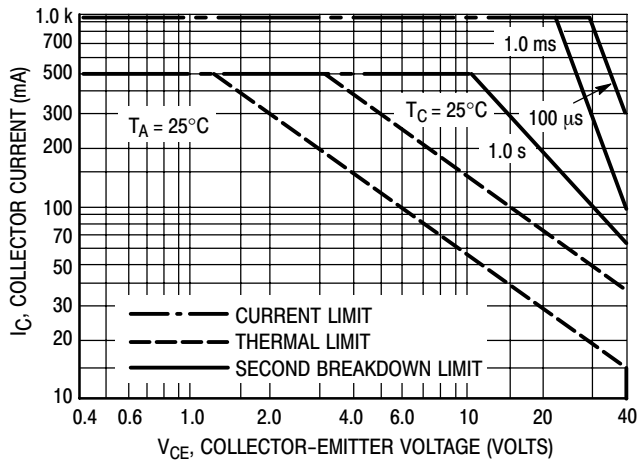
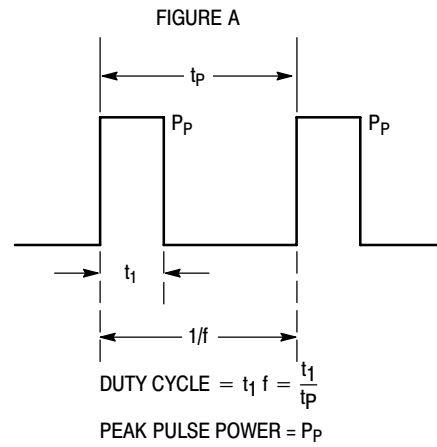


Figure 13. Active Region Safe Operating Area

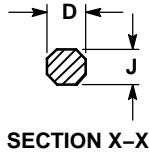
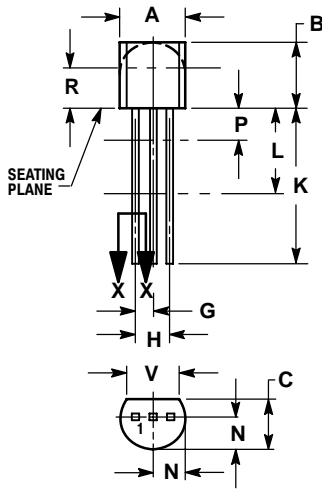


Design Note: Use of Transient Thermal Resistance Data

MPSA13, MPSA14

PACKAGE DIMENSIONS

TO-92
TO-226AA
CASE 29-11
ISSUE AL




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
E	0.045	0.055	1.15	1.39
F	0.095	0.105	2.42	2.66
G	0.015	0.020	0.39	0.50
H	0.500	---	12.70	---
I	0.250	---	6.35	---
J	0.080	0.105	2.04	2.66
K	---	0.100	---	2.54
L	0.115	---	2.93	---
M	0.135	---	3.43	---

STYLE 1:

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

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