

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	$^\circ\text{C}/\text{mW}$

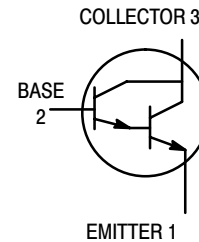
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

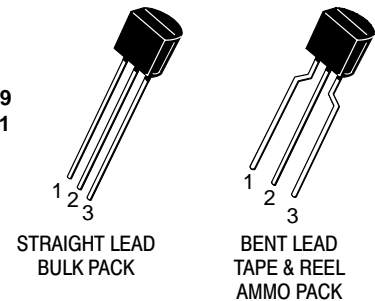


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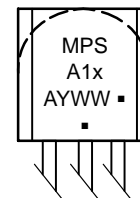
<http://onsemi.com>



TO-92
CASE 29
STYLE 1



MARKING DIAGRAM



- 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.

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

Characteristic	Symbol	Min	Max	Unit
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 ($I_C = 10\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 100\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$)	h_{FE}	MPSA13 5,000 MPSA14 10,000 MPSA13 10,000 MPSA14 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

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 / Bulk
MPSA13G	TO–92 (Pb–Free)	5000 Units / Bulk
MPSA13RLRA	TO–92	2000 / Tape & Reel
MPSA13RLRAG	TO–92 (Pb–Free)	2000 / Tape & Reel
MPSA13RLRMG	TO–92 (Pb–Free)	2000 / Ammo Pack
MPSA13RLRPG	TO–92 (Pb–Free)	2000 / Ammo Pack
MPSA13ZL1G	TO–92 (Pb–Free)	2000 / Ammo Pack
MPSA14G	TO–92 (Pb–Free)	5000 Units / Bulk
MPSA14RLRAG	TO–92 (Pb–Free)	2000 / Tape & Reel
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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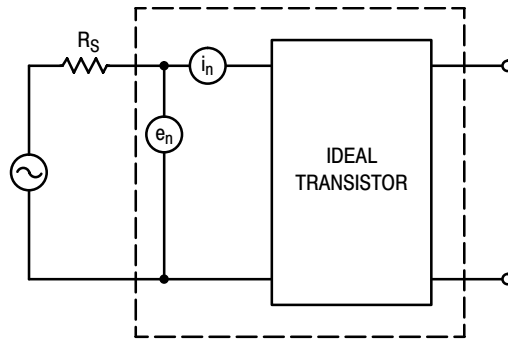


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

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

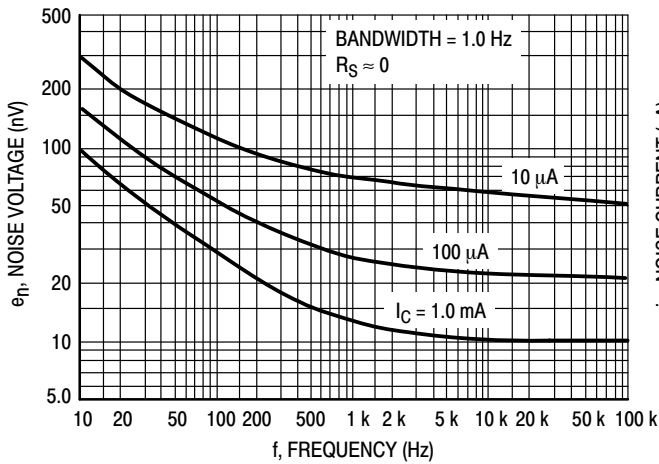


Figure 2. Noise Voltage

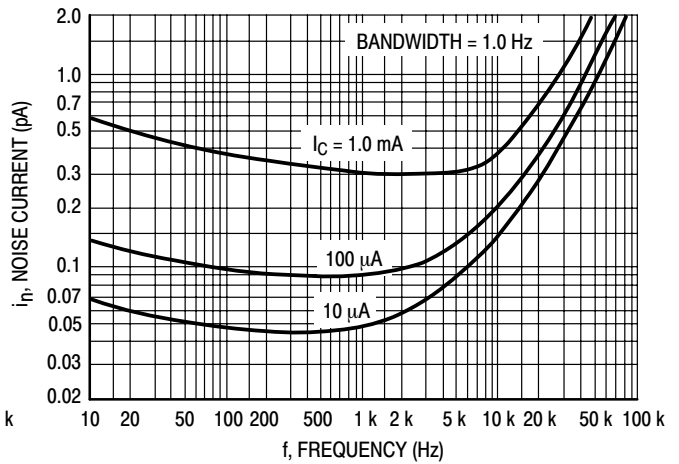


Figure 3. Noise Current

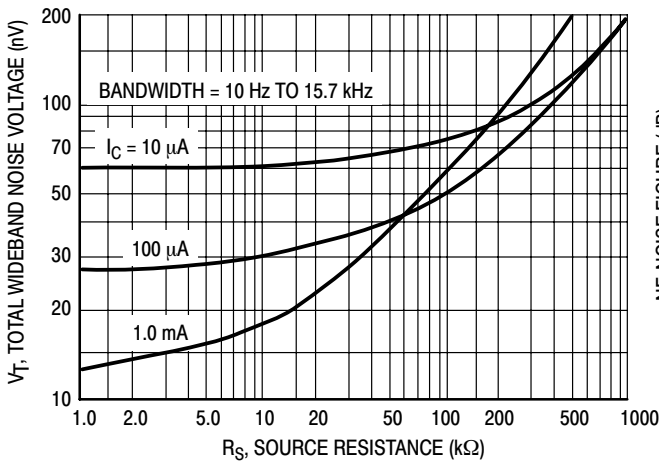


Figure 4. Total Wideband Noise Voltage

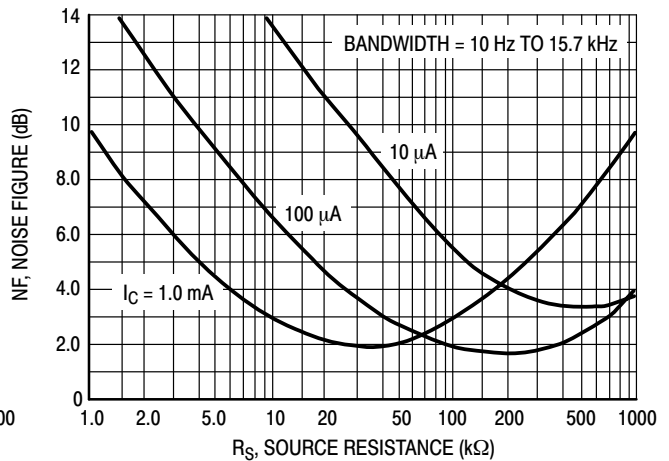


Figure 5. Wideband Noise Figure

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SMALL-SIGNAL CHARACTERISTICS

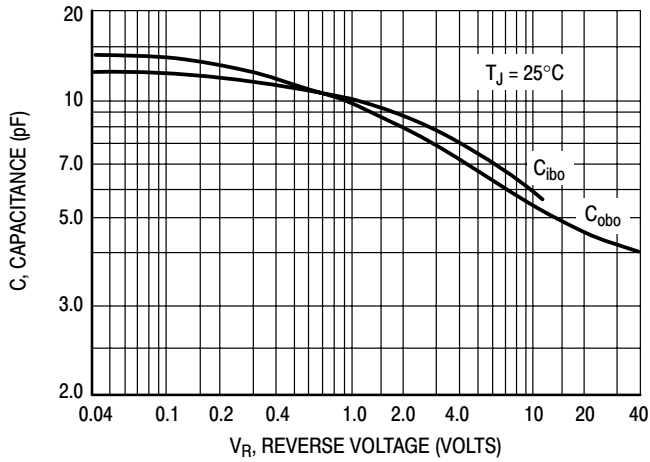


Figure 6. Capacitance

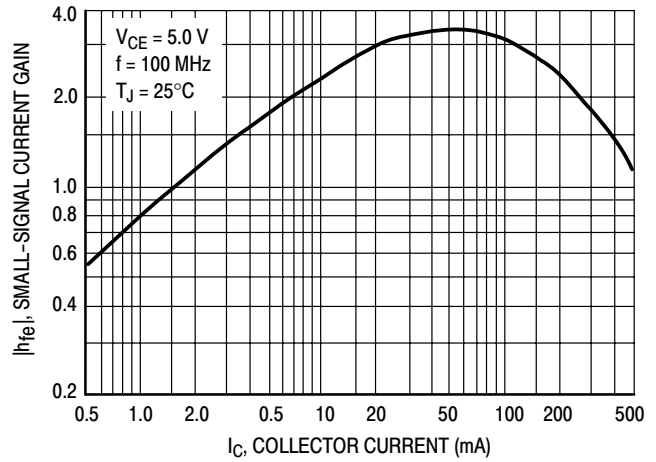


Figure 7. High Frequency Current Gain

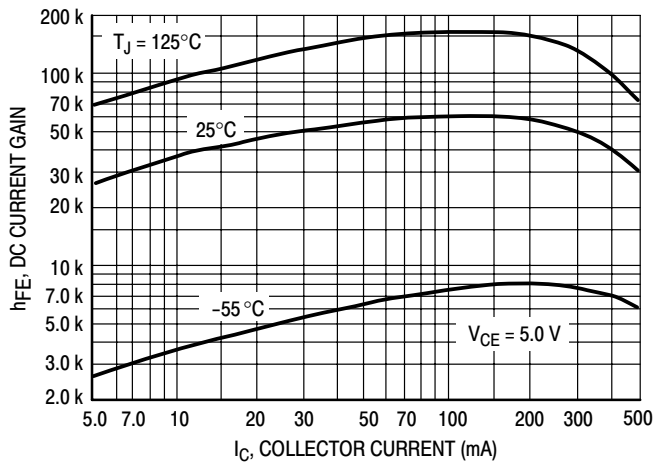


Figure 8. DC Current Gain

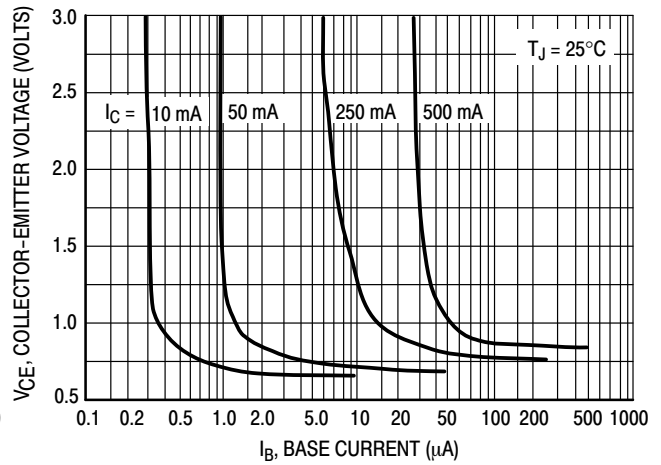


Figure 9. Collector Saturation Region

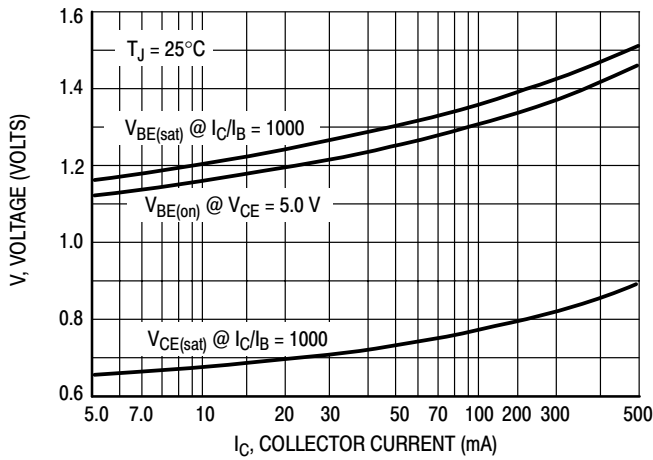


Figure 10. "On" Voltages

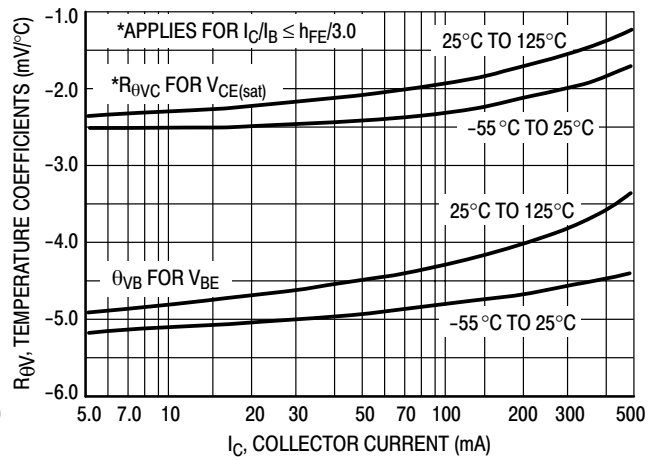


Figure 11. Temperature Coefficients

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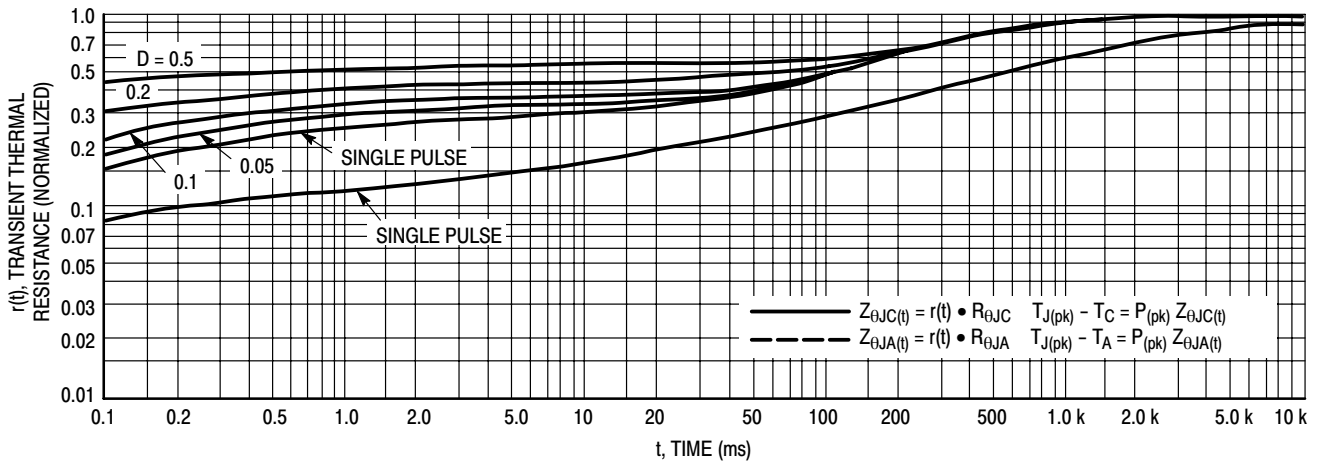


Figure 12. Thermal Response

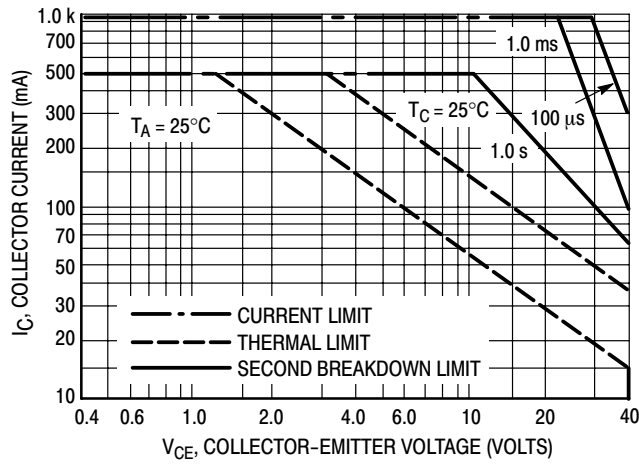
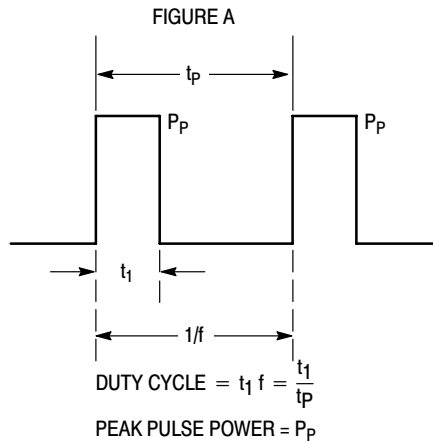


Figure 13. Active Region Safe Operating Area



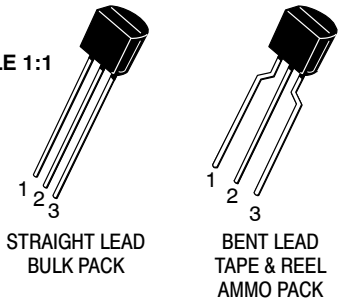
Design Note: Use of Transient Thermal Resistance Data

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®

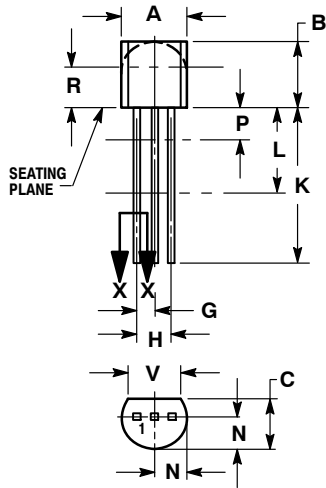


SCALE 1:1

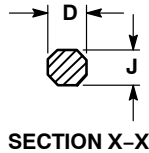


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CASE 29-11
ISSUE AM

DATE 09 MAR 2007



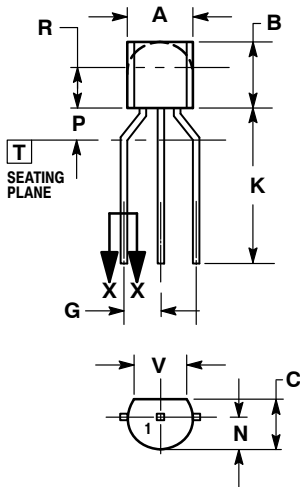
STRAIGHT LEAD
BULK PACK



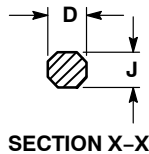
NOTES:

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
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---



BENT LEAD
TAPE & REEL
AMMO PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLES ON PAGE 2

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CASE 29-11
ISSUE AM

DATE 09 MAR 2007

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|--|---|---|--|--|
| <p>STYLE 1:
 PIN 1. EMITTER
 2. BASE
 3. COLLECTOR</p> | <p>STYLE 2:
 PIN 1. BASE
 2. EMITTER
 3. COLLECTOR</p> | <p>STYLE 3:
 PIN 1. ANODE
 2. ANODE
 3. CATHODE</p> | <p>STYLE 4:
 PIN 1. CATHODE
 2. CATHODE
 3. ANODE</p> | <p>STYLE 5:
 PIN 1. DRAIN
 2. SOURCE
 3. GATE</p> |
| <p>STYLE 6:
 PIN 1. GATE
 2. SOURCE & SUBSTRATE
 3. DRAIN</p> | <p>STYLE 7:
 PIN 1. SOURCE
 2. DRAIN
 3. GATE</p> | <p>STYLE 8:
 PIN 1. DRAIN
 2. GATE
 3. SOURCE & SUBSTRATE</p> | <p>STYLE 9:
 PIN 1. BASE 1
 2. EMITTER
 3. BASE 2</p> | <p>STYLE 10:
 PIN 1. CATHODE
 2. GATE
 3. ANODE</p> |
| <p>STYLE 11:
 PIN 1. ANODE
 2. CATHODE & ANODE
 3. CATHODE</p> | <p>STYLE 12:
 PIN 1. MAIN TERMINAL 1
 2. GATE
 3. MAIN TERMINAL 2</p> | <p>STYLE 13:
 PIN 1. ANODE 1
 2. GATE
 3. CATHODE 2</p> | <p>STYLE 14:
 PIN 1. EMITTER
 2. COLLECTOR
 3. BASE</p> | <p>STYLE 15:
 PIN 1. ANODE 1
 2. CATHODE
 3. ANODE 2</p> |
| <p>STYLE 16:
 PIN 1. ANODE
 2. GATE
 3. CATHODE</p> | <p>STYLE 17:
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 2. BASE
 3. EMITTER</p> | <p>STYLE 18:
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 3. NOT CONNECTED</p> | <p>STYLE 19:
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 3. CATHODE</p> | <p>STYLE 20:
 PIN 1. NOT CONNECTED
 2. CATHODE
 3. ANODE</p> |
| <p>STYLE 21:
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 2. EMITTER
 3. BASE</p> | <p>STYLE 22:
 PIN 1. SOURCE
 2. GATE
 3. DRAIN</p> | <p>STYLE 23:
 PIN 1. GATE
 2. SOURCE
 3. DRAIN</p> | <p>STYLE 24:
 PIN 1. EMITTER
 2. COLLECTOR/ANODE
 3. CATHODE</p> | <p>STYLE 25:
 PIN 1. MT 1
 2. GATE
 3. MT 2</p> |
| <p>STYLE 26:
 PIN 1. V_{CC}
 2. GROUND 2
 3. OUTPUT</p> | <p>STYLE 27:
 PIN 1. MT
 2. SUBSTRATE
 3. MT</p> | <p>STYLE 28:
 PIN 1. CATHODE
 2. ANODE
 3. GATE</p> | <p>STYLE 29:
 PIN 1. NOT CONNECTED
 2. ANODE
 3. CATHODE</p> | <p>STYLE 30:
 PIN 1. DRAIN
 2. GATE
 3. SOURCE</p> |
| <p>STYLE 31:
 PIN 1. GATE
 2. DRAIN
 3. SOURCE</p> | <p>STYLE 32:
 PIN 1. BASE
 2. COLLECTOR
 3. EMITTER</p> | <p>STYLE 33:
 PIN 1. RETURN
 2. INPUT
 3. OUTPUT</p> | <p>STYLE 34:
 PIN 1. INPUT
 2. GROUND
 3. LOGIC</p> | <p>STYLE 35:
 PIN 1. GATE
 2. COLLECTOR
 3. EMITTER</p> |

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