Complementary Power Transistors

DPAK For Surface Mount Applications

MJD31 (NPN), MJD32 (PNP)

Designed for general purpose amplifier and low speed switching applications.

Features

- Lead Formed for Surface Mount Applications in Plastic Sleeves
- Straight Lead Version in Plastic Sleeves (“1” Suffix)
- Lead Formed Version in 16 mm Tape and Reel (“T4” Suffix)
- Electrically Similar to Popular TIP31 and TIP32 Series
- Epoxy Meets UL 94, V−0 @ 0.125 in
- NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector−Emitter Voltage MJD31, MJD32 MJD31C, MJD32C	V_{CEO}	 40 100	Vdc
Collector−Base Voltage MJD31, MJD32 MJD31C, MJD32C	V_{CB}	 40 100	Vdc
Emitter−Base Voltage	V_{EB}	5.0	Vdc
Collector Current − Continuous	I_C	3.0	Adc
Collector Current − Peak	I_{CM}	5.0	Adc
Base Current	I_B	1.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 15 0.12	 W W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	 1.56 0.012	 W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C
ESD − Human Body Model	HBM	3B	V
ESD − Machine Model	MM	C	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	8.3	°C/W
Thermal Resistance, Junction−to−Ambient*	$R_{\theta JA}$	80	°C/W
Lead Temperature for Soldering Purposes	T_L	260	°C

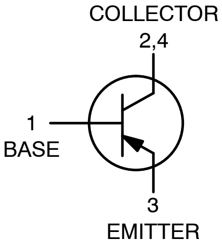
*These ratings are applicable when surface mounted on the minimum pad sizes recommended.

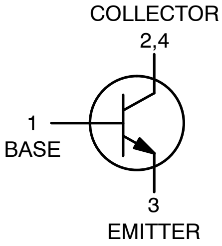
ON Semiconductor®

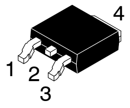
www.onsemi.com

SILICON POWER TRANSISTORS 3 AMPERES 40 AND 100 VOLTS 15 WATTS

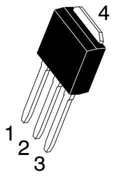
COMPLEMENTARY





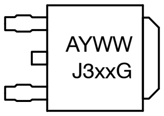


DPAK
CASE 369C
STYLE 1

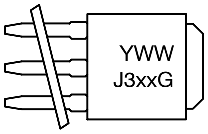


IPAK
CASE 369D
STYLE 1

MARKING DIAGRAMS



DPAK



IPAK

A = Site Code
Y = Year
WW = Work Week
xx = 1, 1C, 2, or 2C
G = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (Note 1) (I_C = 30 mAdc, I_B = 0) MJD31, MJD32 MJD31C, MJD32C	$V_{CEO(sus)}$	40 100	− −	Vdc
Collector Cutoff Current (V_{CE} = 40 Vdc, I_B = 0) MJD31, MJD32 (V_{CE} = 60 Vdc, I_B = 0) MJD31C, MJD32C	I_{CEO}	− −	50 50	μAdc
Collector Cutoff Current (V_{CE} = Rated V_{CEO}, V_{EB} = 0)	ICES	−	20	μAdc
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)	I_{EBO}	−	1	mAdc
ON CHARACTERISTICS (Note 1)				
DC Current Gain (I_C = 1 Adc, V_{CE} = 4 Vdc) (I_C = 3 Adc, V_{CE} = 4 Vdc)	h_{FE}	25 10	− 50	
Collector−Emitter Saturation Voltage (I_C = 3 Adc, I_B = 375 mAdc)	$V_{CE(sat)}$	−	1.2	Vdc
Base−Emitter On Voltage (I_C = 3 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	−	1.8	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain − Bandwidth Product (Note 2) (I_C = 500 mAdc, V_{CE} = 10 Vdc, f_{test} = 1 MHz)	f_T	3	−	MHz
Small−Signal Current Gain (I_C = 0.5 Adc, V_{CE} = 10 Vdc, f = 1 kHz)	h_{fe}	20	−	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. $f_T = |h_{fe}| \bullet f_{test}$.

TYPICAL CHARACTERISTICS

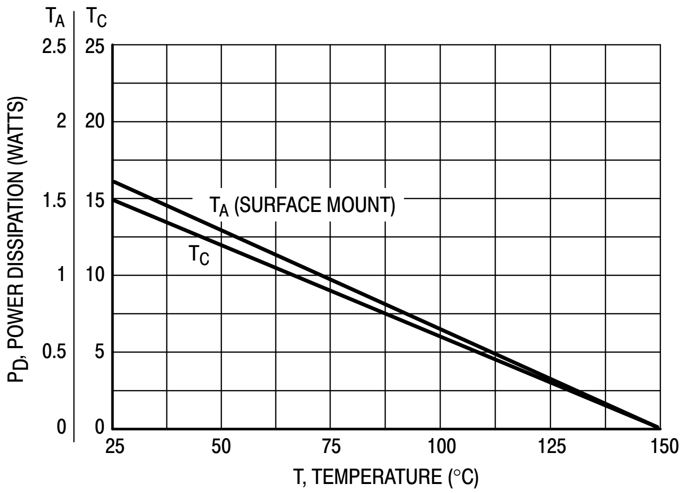
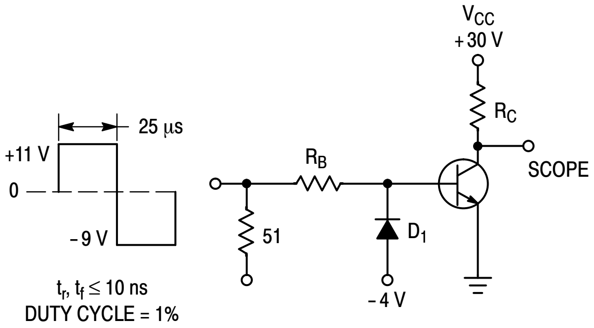


Figure 1. Power Derating



R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS
D_1 MUST BE FAST RECOVERY TYPE, e.g.:
1N5825 USED ABOVE $I_B \approx 100$ mA
MSD6100 USED BELOW $I_B \approx 100$ mA
REVERSE ALL POLARITIES FOR PNP.

Figure 2. Switching Time Test Circuit

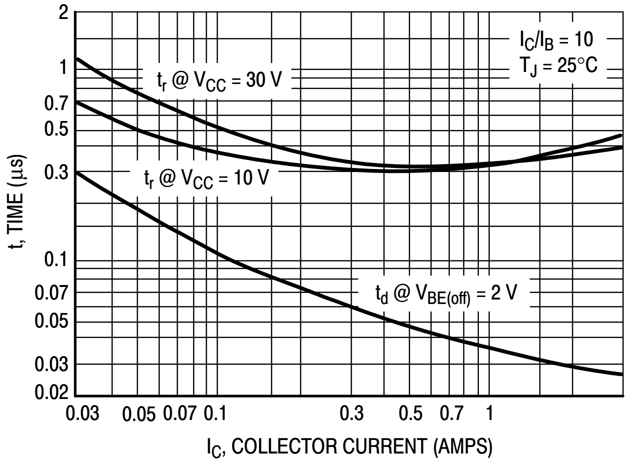


Figure 3. Turn−On Time

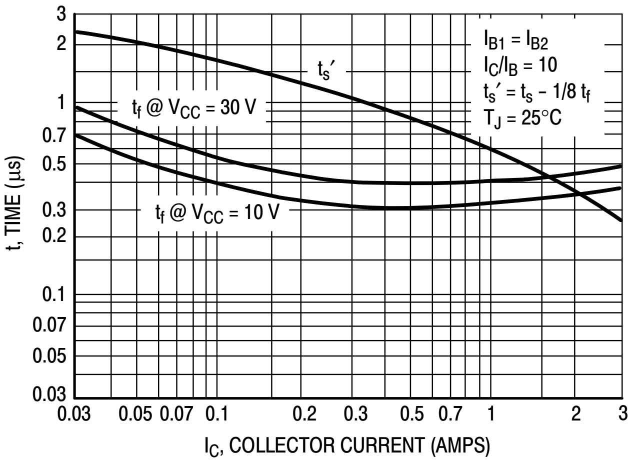


Figure 4. Turn−Off Time

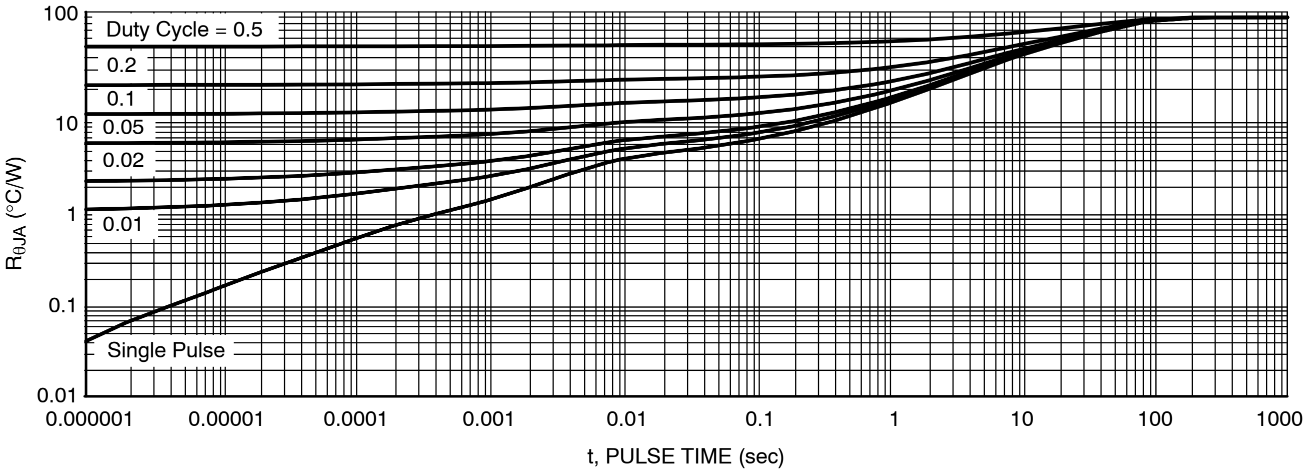


Figure 5. Thermal Response

TYPICAL CHARACTERISTICS – MJD31, MJD31C (NPN)

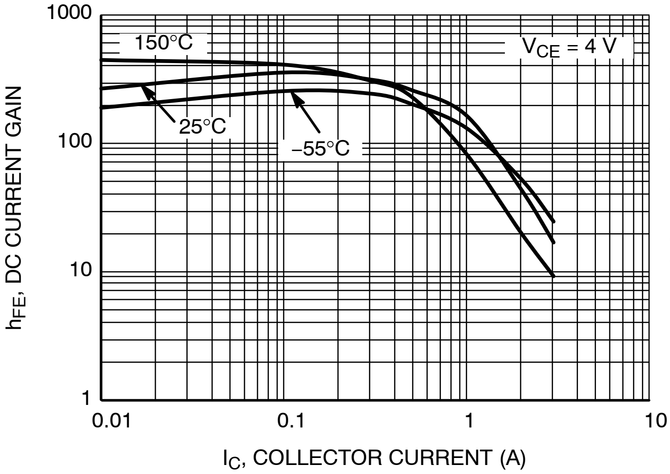


Figure 6. DC Current Gain at V_{CE} = 4 V

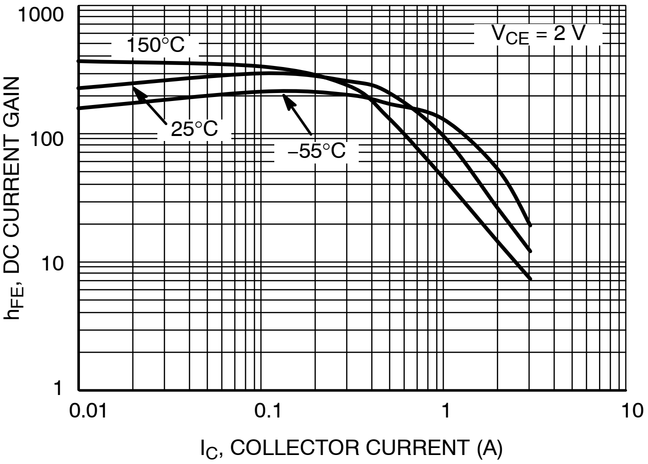


Figure 7. DC Current Gain at V_{CE} = 2 V

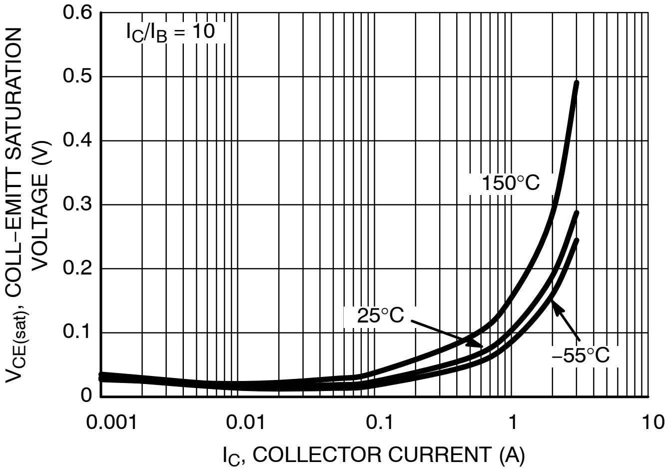


Figure 8. Collector−Emitter Saturation Voltage

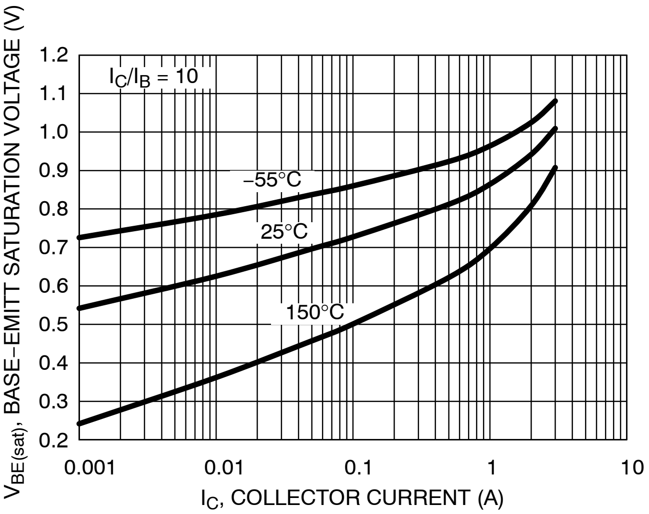


Figure 9. Base−Emitter Saturation Voltage

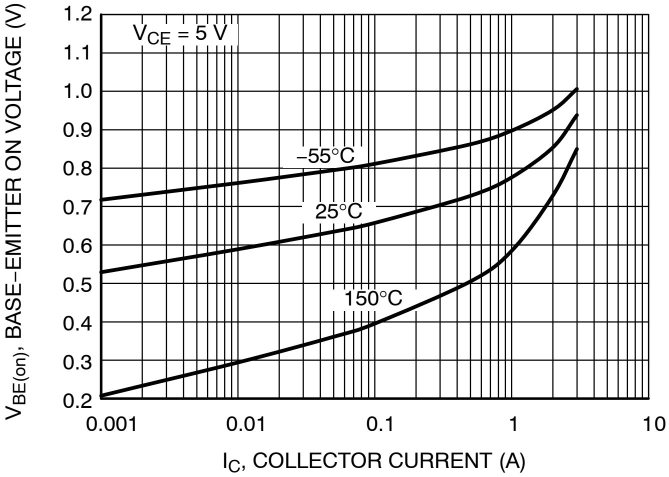


Figure 10. Base-Emitter “On” Voltage

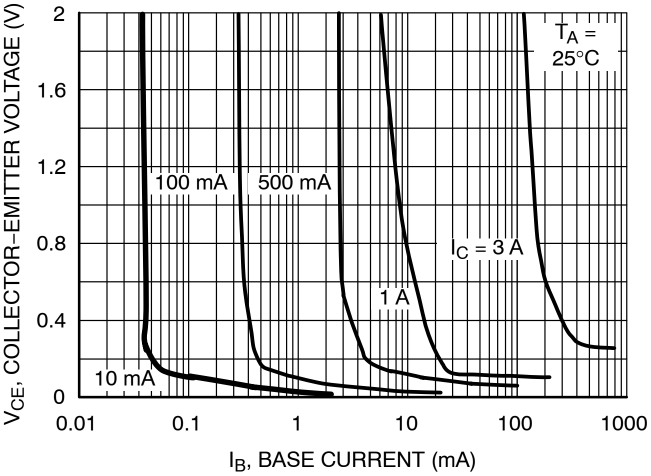


Figure 11. Collector Saturation Region

TYPICAL CHARACTERISTICS − MJD31, MJD31C (NPN)

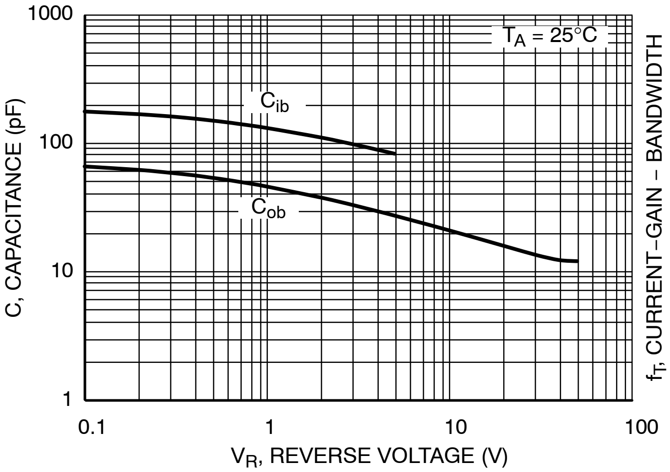


Figure 12. Capacitance

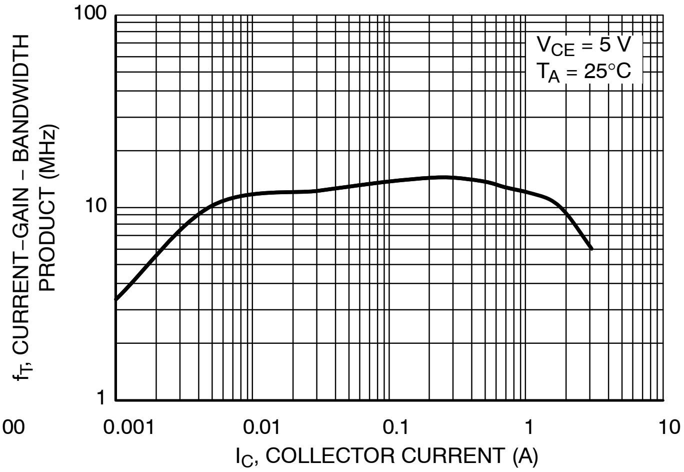


Figure 13. Current−Gain−Bandwidth Product

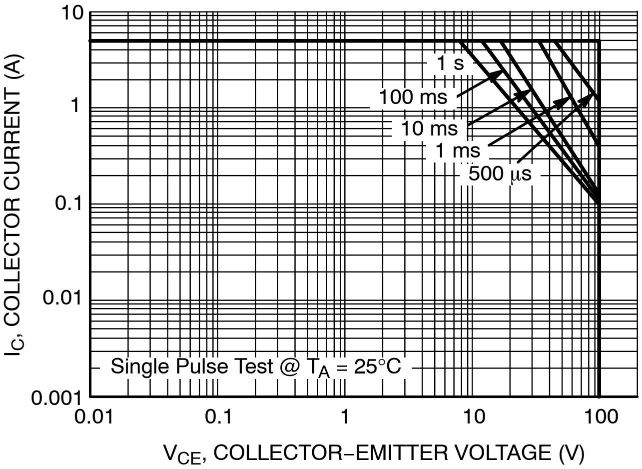


Figure 14. Safe Operating Area

TYPICAL CHARACTERISTICS − MJD32, MJD32C (PNP)

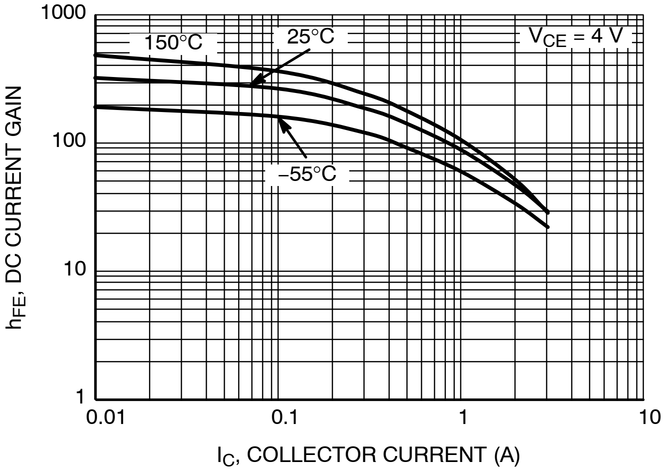


Figure 15. DC Current Gain at V_{CE} = 4 V

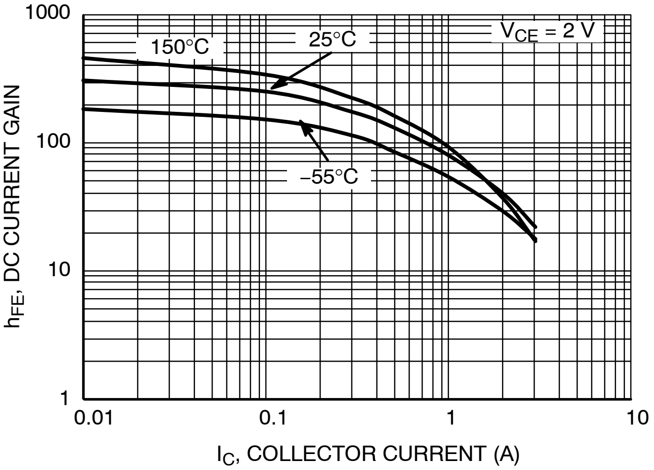


Figure 16. DC Current Gain at V_{CE} = 2 V

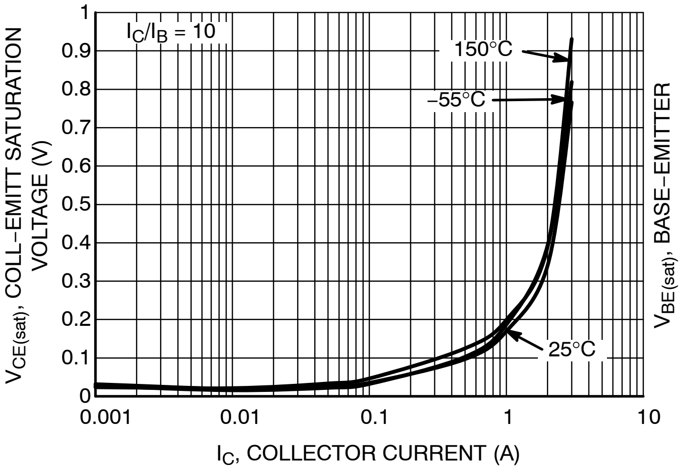


Figure 17. Collector−Emitter Saturation Voltage

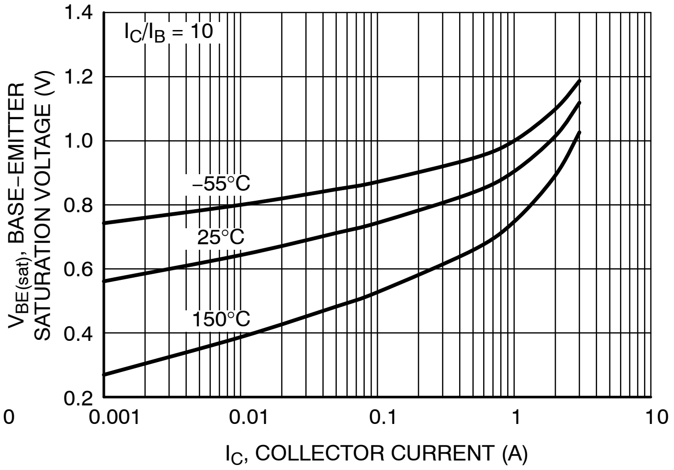


Figure 18. Base−Emitter Saturation Voltage

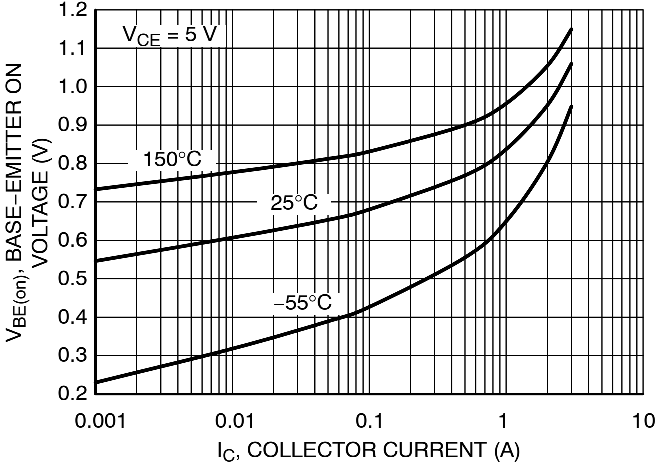


Figure 19. Base−Emitter “On” Voltage

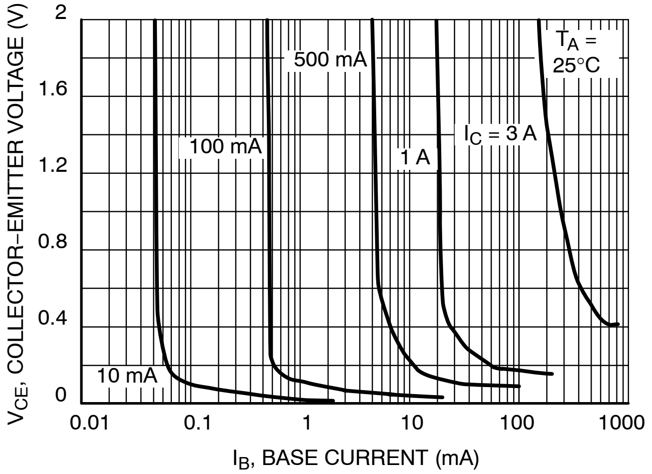


Figure 20. Collector Saturation Region

TYPICAL CHARACTERISTICS

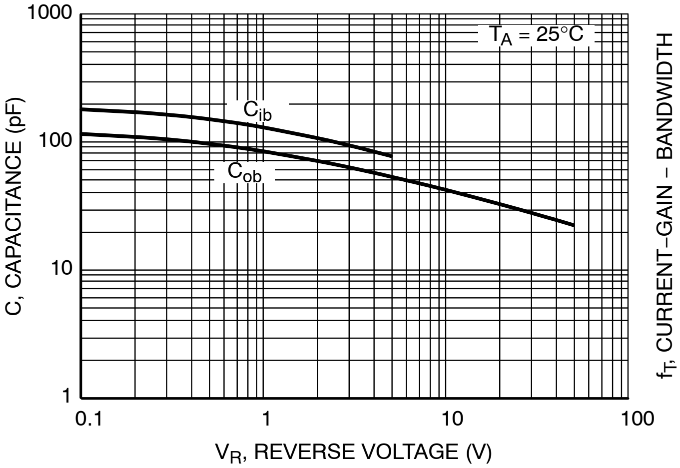


Figure 21. Capacitance

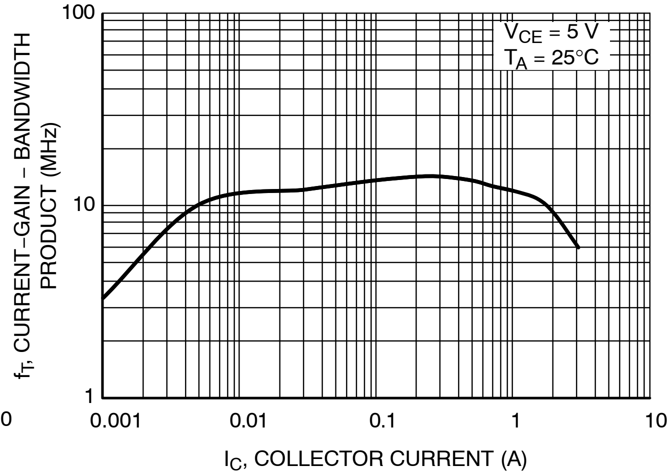


Figure 22. Current−Gain−Bandwidth Product

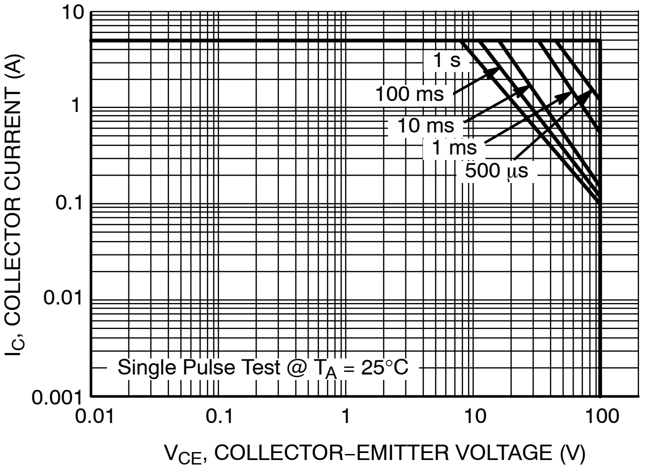


Figure 23. Safe Operating Area

ORDERING INFORMATION

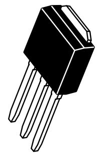
Device	Package Type	Package	Shipping†
MJD31CG	DPAK (Pb−Free)	369C	75 Units / Rail
NJVMJD31CG*	DPAK (Pb−Free)	369C	75 Units / Rail
MJD31C1G	IPAK (Pb−Free)	369D	75 Units / Rail
MJD31CRLG	DPAK (Pb−Free)	369C	1,800 / Tape & Reel
NJVMJD31CRLG*	DPAK (Pb−Free)	369C	1,800 / Tape & Reel
MJD31CT4G	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
NJVMJD31CT4G*	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
MJD31T4G	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
NJVMJD31T4G*	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
MJD32CG	DPAK (Pb−Free)	369C	75 Units / Rail
NJVMJD32CG*	DPAK (Pb−Free)	369C	75 Units / Rail
MJD32CRLG	DPAK (Pb−Free)	369C	1,800 / Tape & Reel
MJD32CT4G	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
NJVMJD32CT4G*	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
MJD32RLG	DPAK (Pb−Free)	369C	1,800 / Tape & Reel
MJD32T4G	DPAK (Pb−Free)	369C	2,500 / Tape & Reel
NJVMJD32T4G*	DPAK (Pb−Free)	369C	2,500 / Tape & Reel

†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.

*NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

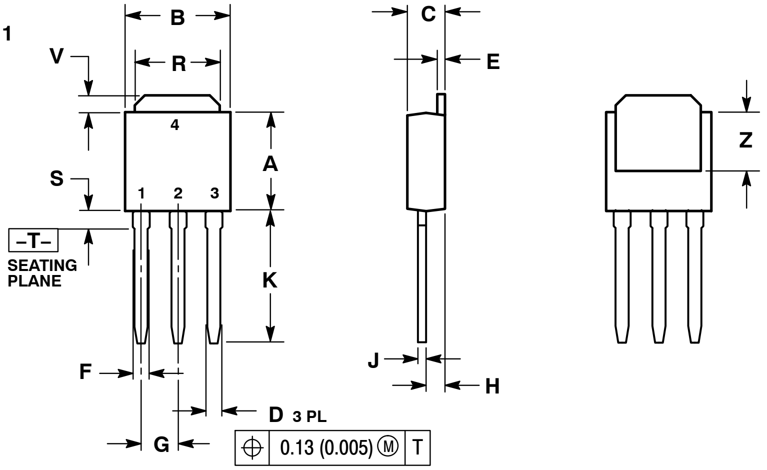
ON Semiconductor®



IPAK
CASE 369D−01
ISSUE C

DATE 15 DEC 2010

SCALE 1:1



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

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.235	0.245	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

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

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

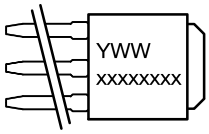
STYLE 5:
PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

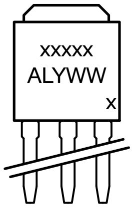
STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

MARKING DIAGRAMS

Discrete



Integrated Circuits



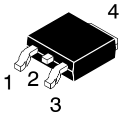
xxxxxxxxx = Device Code
A = Assembly Location
IL = Wafer Lot
Y = Year
WW = Work Week

DOCUMENT NUMBER: **98AON10528D**

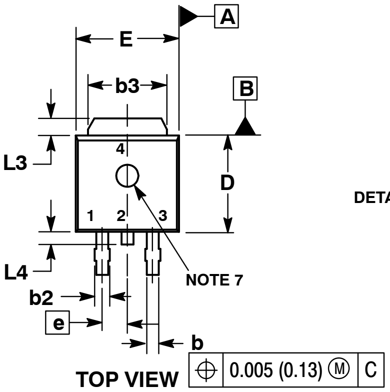
DESCRIPTION: **IPAK (DPAK INSERTION MOUNT)**

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE F

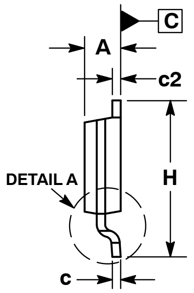
DATE 21 JUL 2015



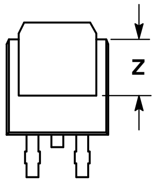
SCALE 1:1



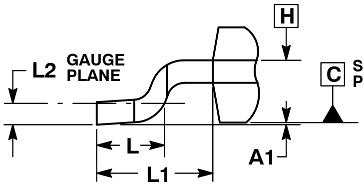
TOP VIEW



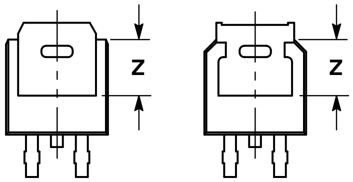
SIDE VIEW



BOTTOM VIEW



DETAIL A
ROTATED 90° CW



BOTTOM VIEW
ALTERNATE CONSTRUCTIONS

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.

	INCHES		MILLIMETERS	
DIM	**MIN**	**MAX**	**MIN**	**MAX**
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114 REF		2.90 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

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

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 5:
PIN 1. GATE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

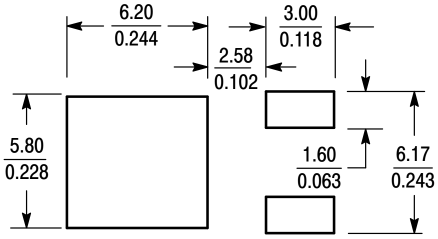
STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 8:
PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

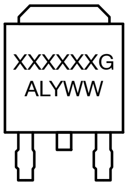
SOLDERING FOOTPRINT*



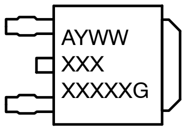
SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

GENERIC MARKING DIAGRAM*



IC



Discrete

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking.

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DESCRIPTION:	**DPAK (SINGLE GAUGE)**	**PAGE 1 OF 1**

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