

# Power Transistor, NPN, Dual General Purpose

## 100 V, 3 A

### MJK31C

These Bipolar Junction Transistors are designed for general purpose power and switching applications such as regulators, converters and power amplifiers. Housed in advanced LFPAK package (5 x 6 mm) with excellent thermal conduction. Automotive end applications include air bag deployment, power train control units, and instrument clusters.

#### Features

- Complementary PNP: MJK32C
- 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, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	$V_{CEO}$	100	Vdc
Emitter-Base Voltage	$V_{EBO}$	5	Vdc
Collector Current – Continuous	$I_C$	3	A
Collector Current – Peak	$I_{CM}$	5	A
Junction and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	°C

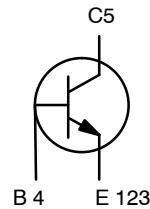
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case per Device (Note 1)	$R_{\theta JC}$	2.4	°C/W
Thermal Resistance, Junction-to-Ambient per Device (Note 1)	$R_{\theta JA}$	45	°C/W
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1)	$P_D$	2.7	W

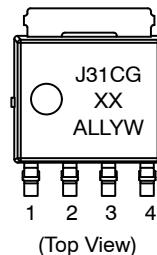
1. Surface-mounted on FR4 board using a 6 cm<sup>2</sup>, 2 oz. Cu collector pad.

#### NPN TRANSISTOR 100 V, 3 A



LFPAK4 5x6  
CASE 760AB

#### MARKING DIAGRAM



J31CG = Specific Device Code  
A = Assembly Location  
LL = Wafer Lot  
Y = Year  
W = Work Week

#### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MJK31CTWG	LFPAK4 5x6 (Pb-Free)	3000 / Tape & Reel
NJVMJK31CTWG	LFPAK4 5x6 (Pb-Free)	3000 / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# MJK31C

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Sustaining Voltage ( $I_C = 30 \text{ mA}$ , $I_B = 0$ )	$V_{CEO(\text{sus})}$	100	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE} = 0$ )	$I_{CES}$	—	—	20	$\mu\text{A}$
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}$ , $I_B = 0$ )	$I_{CEO}$	—	—	50	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 5 \text{ Vdc}$ )	$I_{EBO}$	—	—	1.0	mA
<b>ON CHARACTERISTICS</b>					
Collector-Emitter Saturation Voltage ( $I_C = 3 \text{ Adc}$ , $I_B = 0.375 \text{ Adc}$ )	$V_{CE(\text{sat})}$	—	—	1.2	Vdc
Base-Emitter Saturation Voltage ( $I_C = 3 \text{ Adc}$ , $V_{CE} = 4 \text{ Vdc}$ )	$V_{BE(\text{on})}$	—	—	1.8	Vdc
DC Current Gain ( $V_{CE} = 4 \text{ Vdc}$ , $I_C = 1 \text{ Adc}$ ) ( $V_{CE} = 4 \text{ Vdc}$ , $I_C = 3 \text{ Adc}$ )	$h_{FE}$	25 10	— —	— 60	—
<b>DYNAMIC CHARACTERISTICS</b>					
Gain Bandwidth Product ( $I_C = 0.5 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 1 \text{ MHz}$ )	$f_T$	—	3	—	MHz

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.

## TYPICAL CHARACTERISTICS

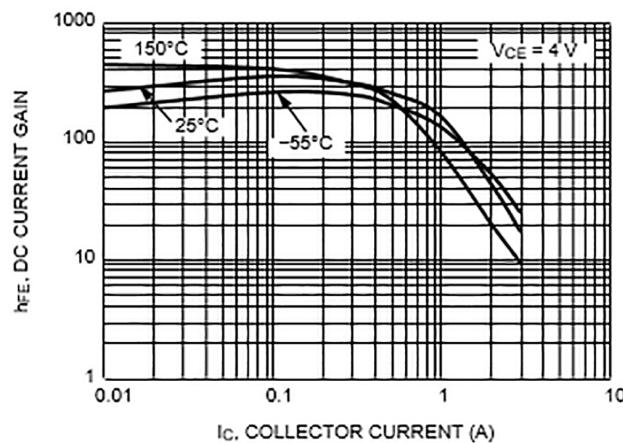


Figure 1. DC Current Gain

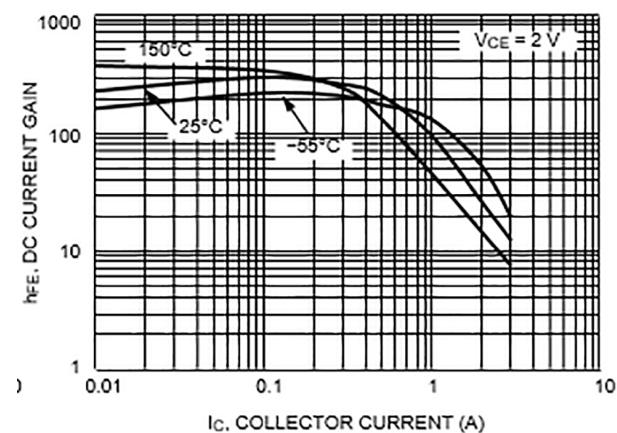


Figure 2. DC Current Gain

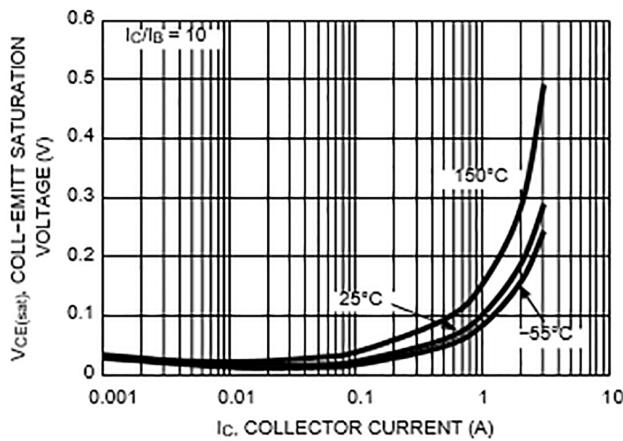
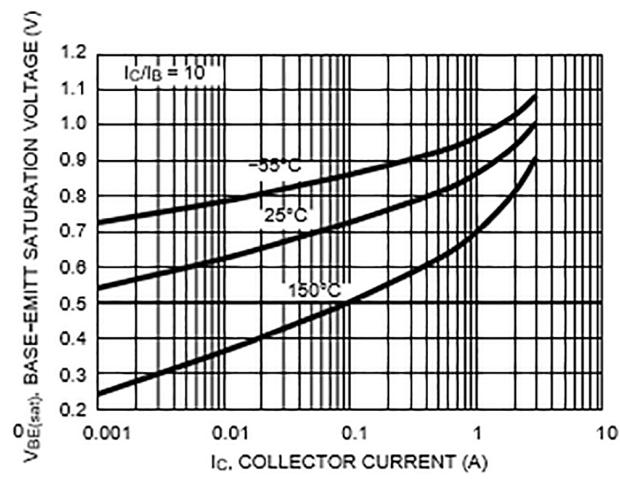
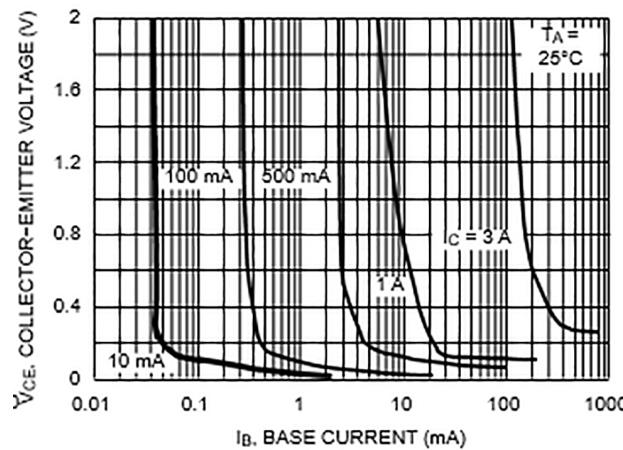
Figure 3. Saturation Voltage  $V_{CE(sat)}$ Figure 4. Saturation Voltage  $V_{BE(sat)}$ 

Figure 5. Collector Saturation Region

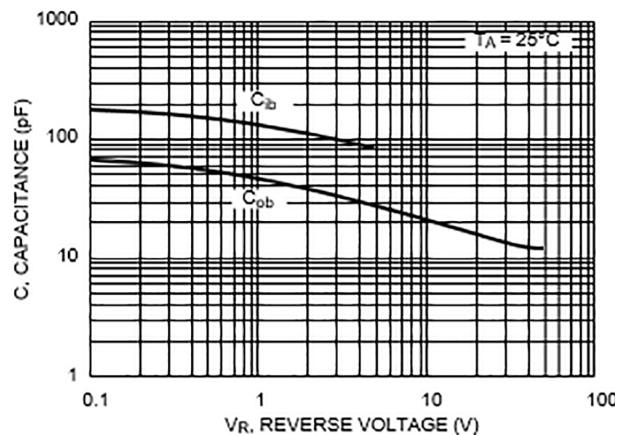
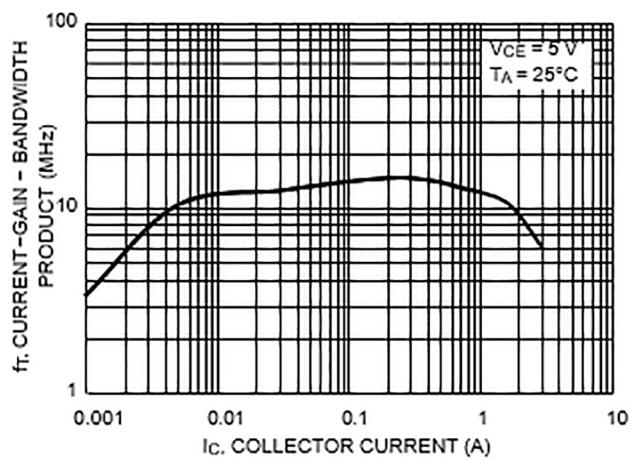
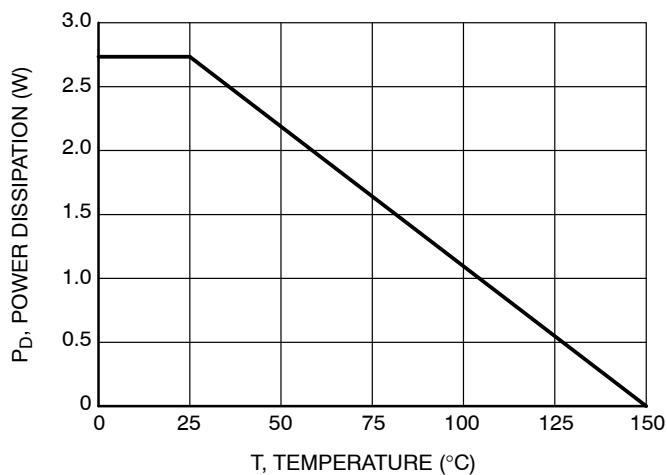


Figure 6. Capacitance

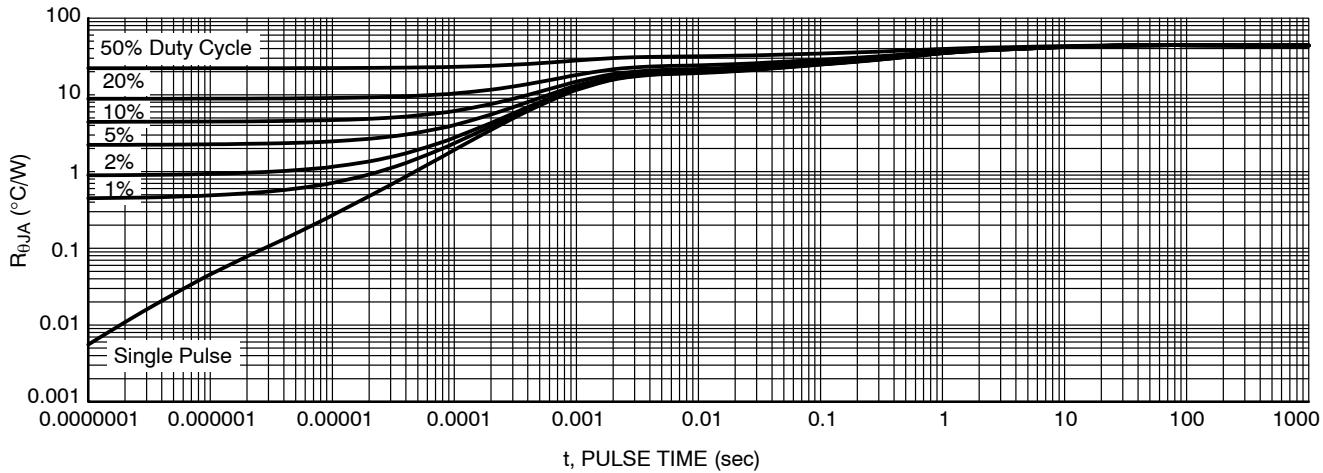
**TYPICAL CHARACTERISTICS (continued)**



**Figure 7. Current-Gain-Bandwidth Product**



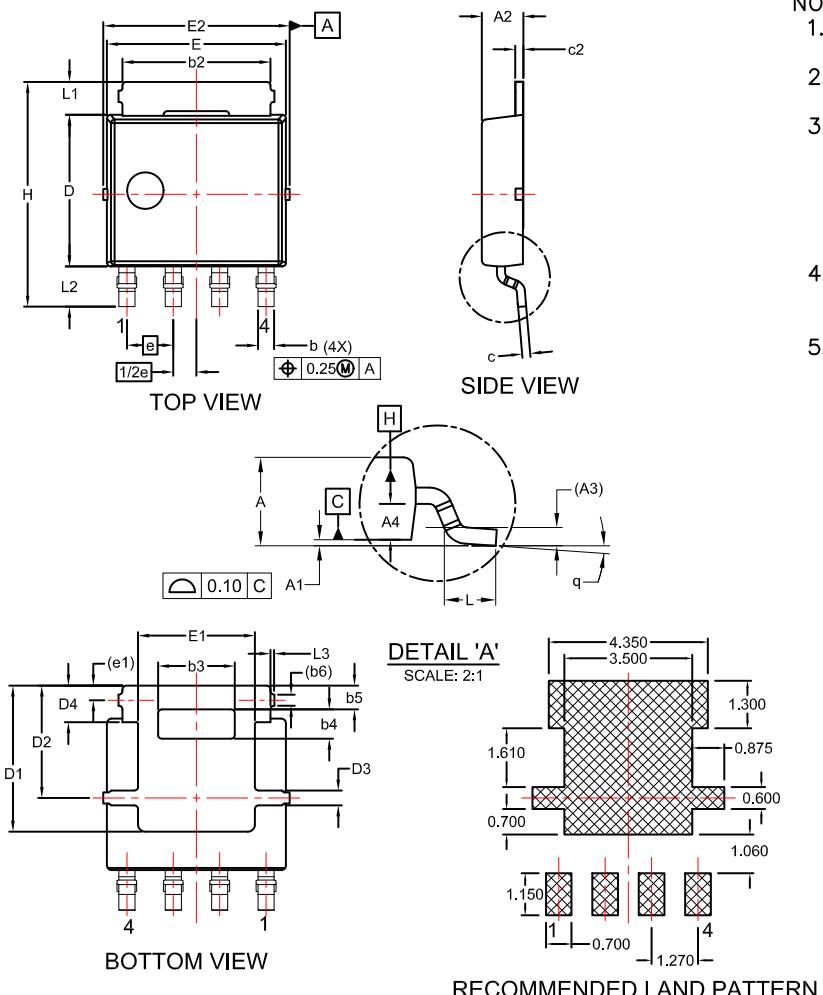
**Figure 8. Power Derating**



**Figure 9. Typical Transient Thermal Response, Junction-to-Case**

## PACKAGE DIMENSIONS

**LFPAK4 5x6**  
CASE 760AB  
ISSUE C



## RECOMMENDED LAND PATTERN

\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

UNIT IN MILLIMETER			
DIM	MIN	NOM	MAX
A	1.10	1.20	1.30
A1	0.00	0.08	0.15
A2	1.10	1.15	1.20
A3	0.25 REF		
A4	0.45	0.50	0.55
b	0.40	0.45	0.50
b2	3.80	4.10	4.40
b3	2.00	2.10	2.20
b4	0.70	0.80	0.90
b5	0.55	0.65	0.75
b6	0.31 REF		
c	0.19	0.22	0.25
c2	0.19	0.22	0.25
D	4.05	4.15	4.25
D1	3.80	4.00	4.20
D2	3.00	3.10	3.20
D3	0.30	0.40	0.50
D4	0.90	1.00	1.10
E	4.80	4.90	5.00
E1	3.10	3.20	3.30
E2	5.00	5.15	5.30
e	1.27 BSC		
1/2e	0.635 BSC		
e1	0.40 REF		
H	6.00	6.15	6.30
L	0.40	0.65	0.85
L1	0.80	0.90	1.00
L2	0.90	1.10	1.30
L3	0.00	0.10	0.20
q	0°	4°	8°

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