MJD31, MJD31C (NPN), MJD32, MJD32C (PNP)

MJD31C and MJD32C are Preferred Devices

Complementary Power Transistors

DPAK For Surface Mount Applications

Designed for general purpose amplifier and low speed switching applications.

- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- 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

ON Semiconductor™

http://onsemi.com

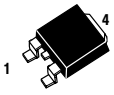
SILICON
POWER TRANSISTORS
3 AMPERES
40 AND 100 VOLTS
15 WATTS

MAXIMUM RATINGS

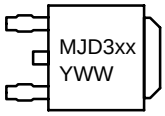
Rating	Symbol	MJD31 MJD32	MJD31C MJD32C	Unit
Collector–Emitter Voltage	V_{CEO}	40	100	Vdc
Collector–Base Voltage	V_{CB}	40	100	Vdc
Emitter–Base Voltage	V_{EB}	5		Vdc
Collector Current – Continuous Peak	I_C	3 5		Adc
Base Current	I_B	1		Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 15 0.12		 Watts W/°C
Total Power Dissipation (Note 1) @ T_A = 25°C Derate above 25°C	P_D	 1.56 0.012		 Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150		°C

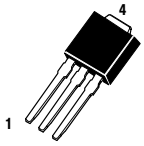
1. These ratings are applicable when surface mounted on the minimum pad size recommended.

MARKING DIAGRAMS

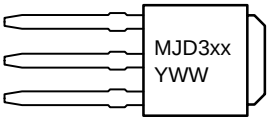


DPAK
CASE 369A
STYLE 1





DPAK
STRAIGHT LEADS
CASE 369
STYLE 1



MJD3xx = Specific Device Code
xx = 1, 1C, 2 or 2C
Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	8.3	°C/W
Thermal Resistance, Junction to Ambient (Note 2)	$R_{\theta JA}$	80	°C/W
Lead Temperature for Soldering Purposes	T_L	260	°C

2. These ratings are applicable when surface mounted on the minimum pad size recommended.

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

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

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

TYPICAL CHARACTERISTICS

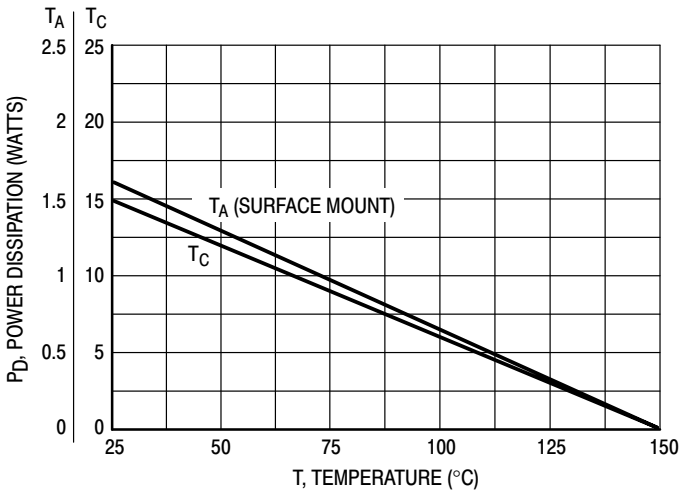
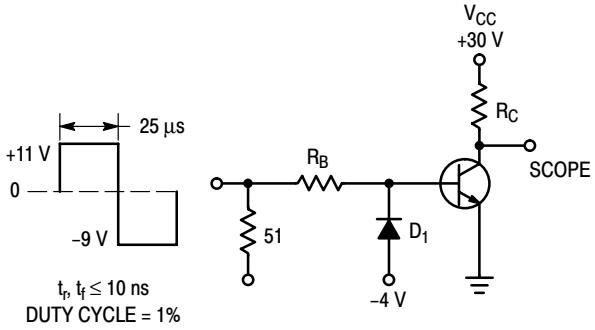


Figure 1. Power Derating



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

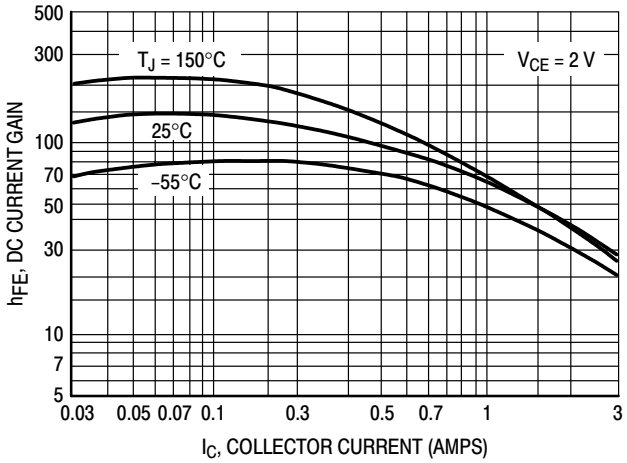


Figure 3. DC Current Gain

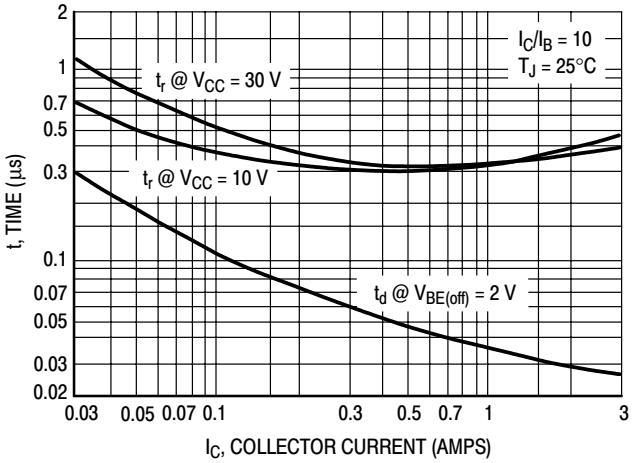


Figure 4. Turn−On Time

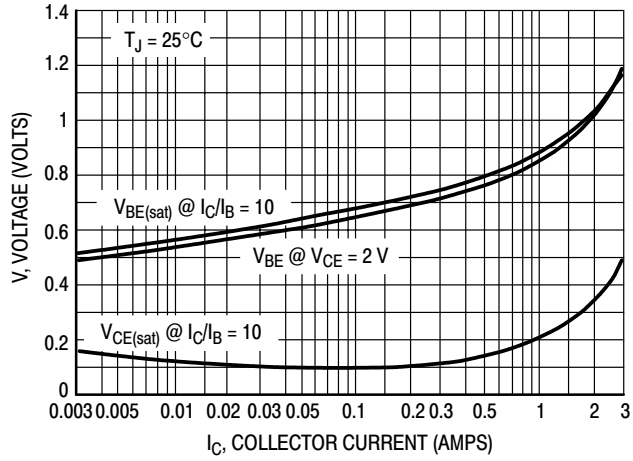


Figure 5. “On” Voltages

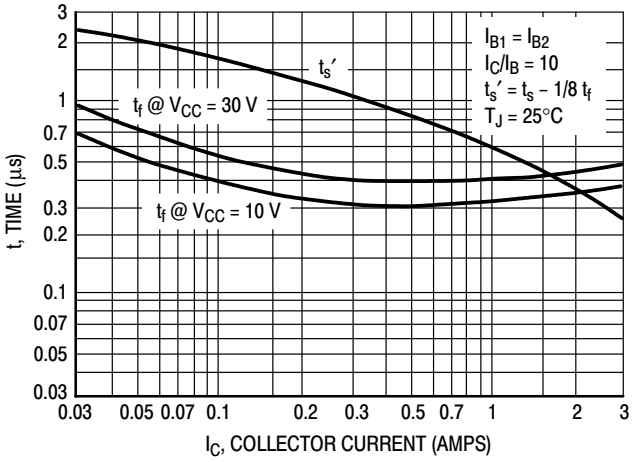


Figure 6. Turn−Off Time

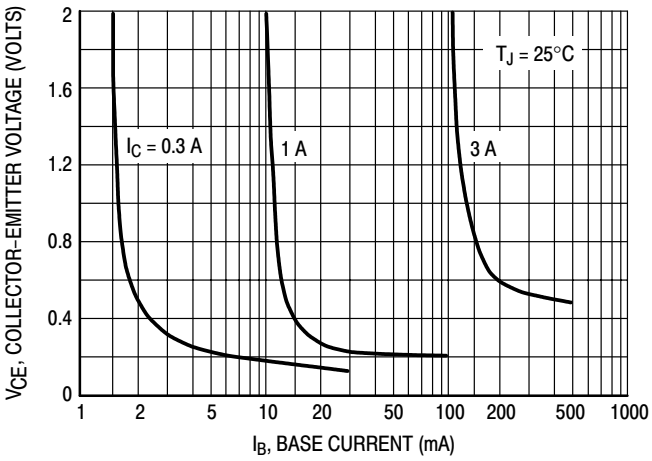


Figure 7. Collector Saturation Region

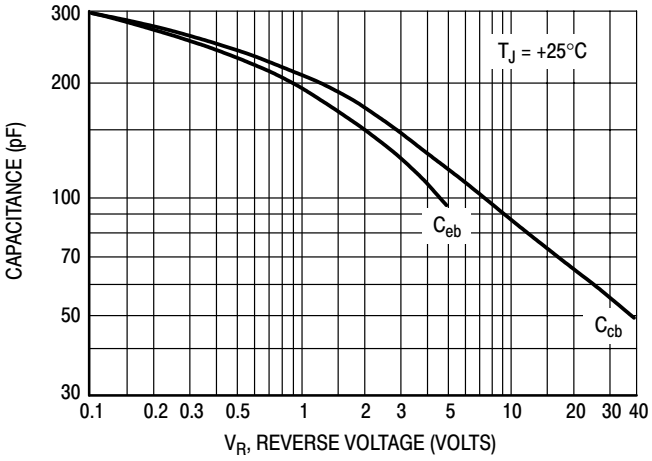


Figure 8. Capacitance

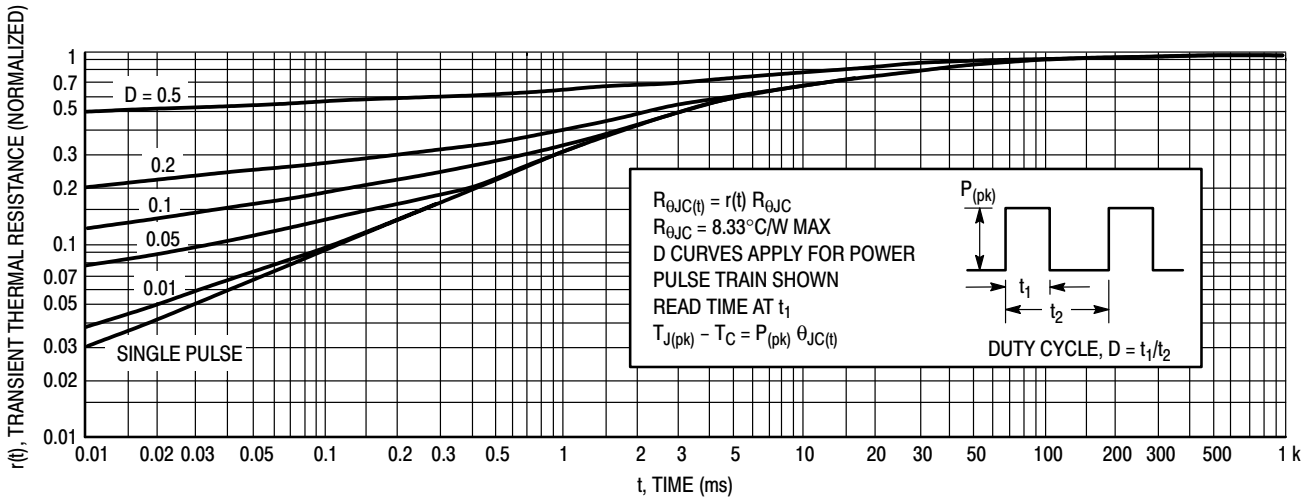


Figure 9. Thermal Response

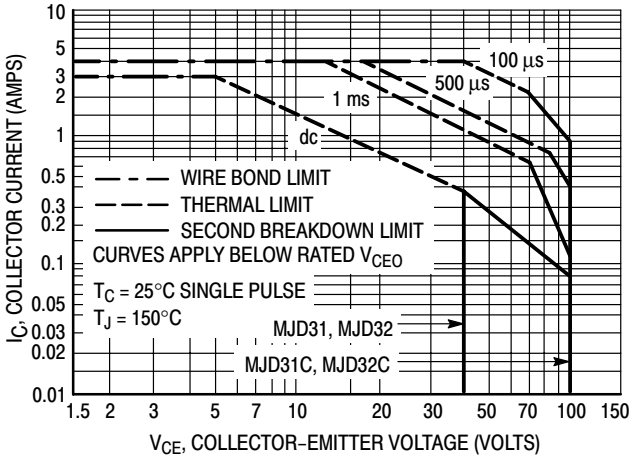
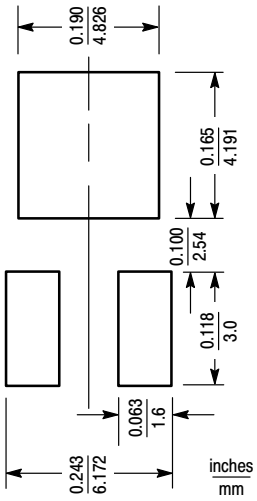


Figure 10. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second 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 10 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 9. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

MINIMUM PAD SIZES RECOMMENDED FOR SURFACE MOUNTED APPLICATIONS

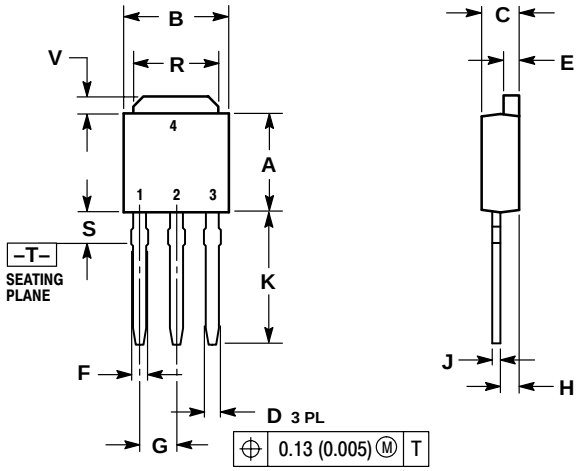


ORDERING INFORMATION

Device	Package	Shipping
MJD31C	DPAK	75 Units / Rail
MJD31CRL	DPAK	1800 Tape & Reel
MJD31CT4	DPAK	2500 Tape & Reel
MJD31C–1	DPAK Straight Leads	75 Units / Rail
MJD31T4	DPAK	2500 Tape & Reel
MJD32C	DPAK	75 Units / Rail
MJD32CRL	DPAK	1800 Tape & Reel
MJD32CT4	DPAK	2500 Tape & Reel
MJD32C–1	DPAK Straight Leads	75 Units / Rail
MJD32RL	DPAK	1800 Tape & Reel
MJD32T4	DPAK	2500 Tape & Reel

PACKAGE DIMENSIONS

DPAK
CASE 369A–13
ISSUE AA

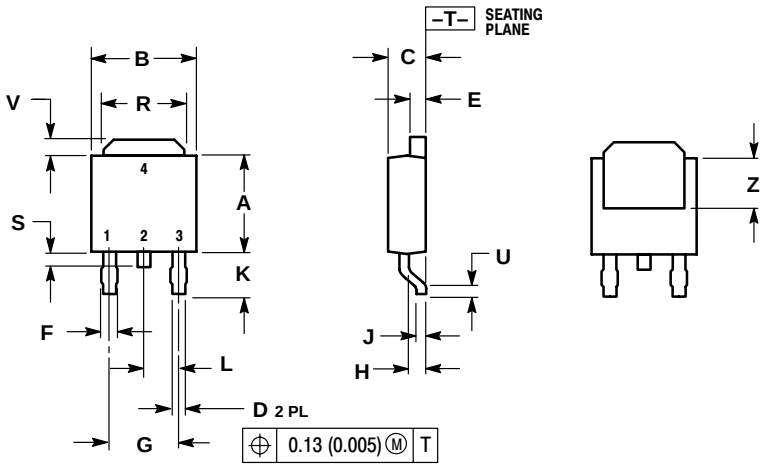


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.250	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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
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	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

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

DPAK
CASE 369–07
ISSUE M



NOTES:
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A	0.235	0.250	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	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	---	0.51	---
V	0.030	0.050	0.77	1.27
Z	0.138	---	3.51	---

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

Notes

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada
Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com

N. American Technical Support: 800–282–9855 Toll Free USA/Canada

JAPAN: ON Semiconductor, Japan Customer Focus Center
4–32–1 Nishi–Gotanda, Shinagawa–ku, Tokyo, Japan 141–0031
Phone: 81–3–5740–2700
Email: r14525@onsemi.com

ON Semiconductor Website: http://onsemi.com

For additional information, please contact your local
Sales Representative.