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MJD31T4G, MJD31CT4G (NPN), MJD32T4G, MJD32CT4G (PNP) Complementary Power Transistors

DPAK For Surface Mount Applications

Designed for general purpose amplifier and low speed switching applications.

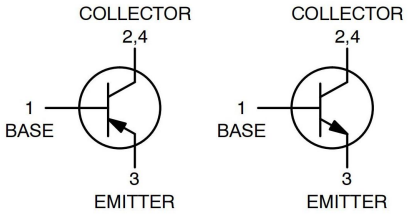
Features

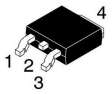
- Lead Formed for Surface Mount Applications in Plastic Sleeves
- Straight Lead Version in Plastic Sleeves ("1" Suffix)
- Lead Formed Version in 16 mm Tape and Reel ("T4" Suffix)
- Electrically Similar to Popular TIP31 and TIP32 Series
- Epoxy Meets UL 94, V−0 @ 0.125 in

- These Devices are Pb−Free and are RoHS Compliant

SILICON
POWER TRANSISTORS
3 AMPERES
40 AND 100 VOLTS
15 WATTS

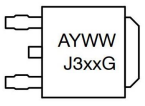
COMPLEMENTARY





DPAK
CASE 369C
STYLE 1

MARKING DIAGRAMS



DPAK

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

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MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector−Emitter Voltage MJD31T4G, MJD32T4G MJD31CT4G, MJD32CT4G	V_{CEO}	 40 100	Vdc
Collector−Base Voltage MJD31T4G, MJD32T4G MJD31CT4G, MJD32CT4G	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 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.

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.

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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) MJD31T4G, MJD32T4G MJD31CT4G, MJD32CT4G	$V_{CEO(sus)}$	 40 100	 – –	Vdc
Collector Cutoff Current (V_{CE} = 40 Vdc, I_B = 0) MJD31T4G, MJD32T4G (V_{CE} = 60 Vdc, I_B = 0) MJD31CT4G, MJD32CT4G MJD31T4G, MJD32T4G MJD31CT4G, MJD32CT4G	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	–	

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

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TYPICAL CHARACTERISTICS

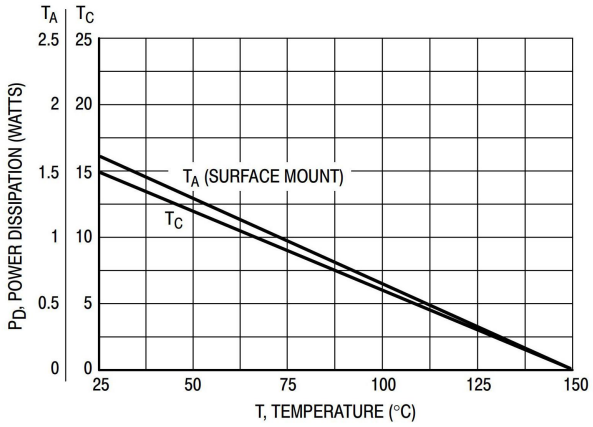
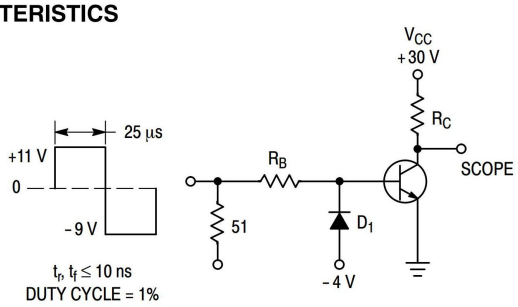


Figure 1. Power Derating



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

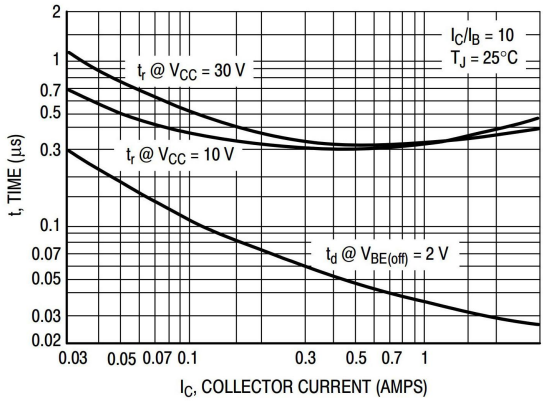


Figure 3. Turn–On Time

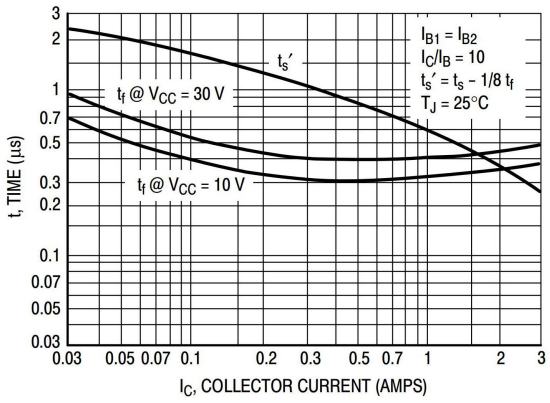


Figure 4. Turn–Off Time

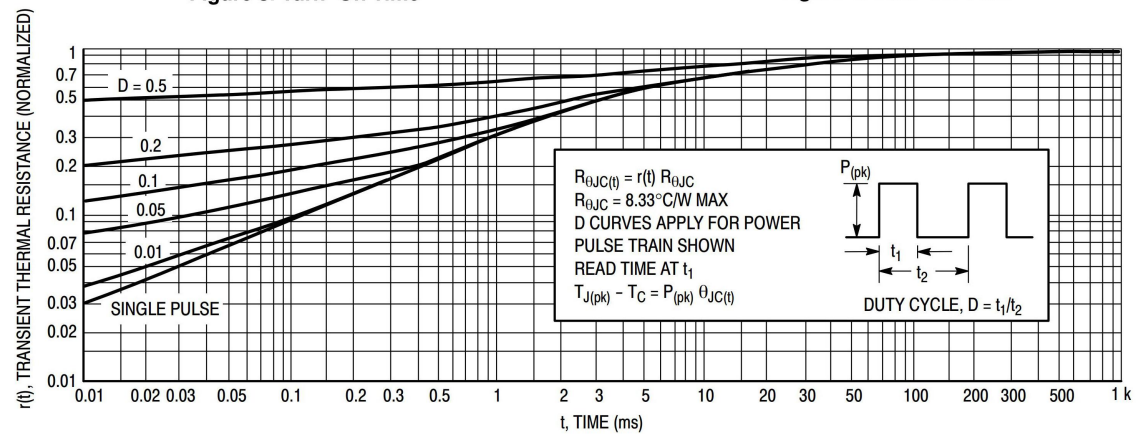


Figure 5. Thermal Response

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TYPICAL CHARACTERISTICS – MJD31, MJD31C (NPN)

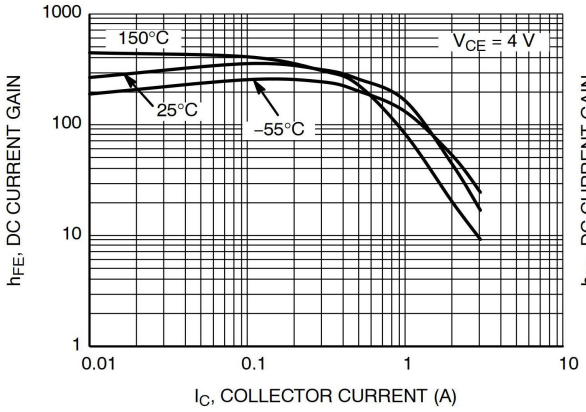

Figure 6. DC Current Gain at V_{CE} = 4 V

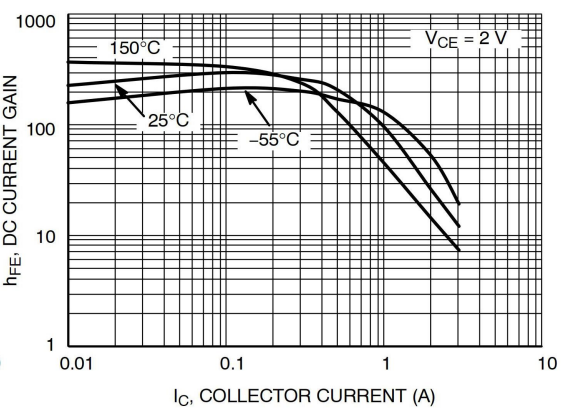

Figure 7. DC Current Gain at V_{CE} = 2 V

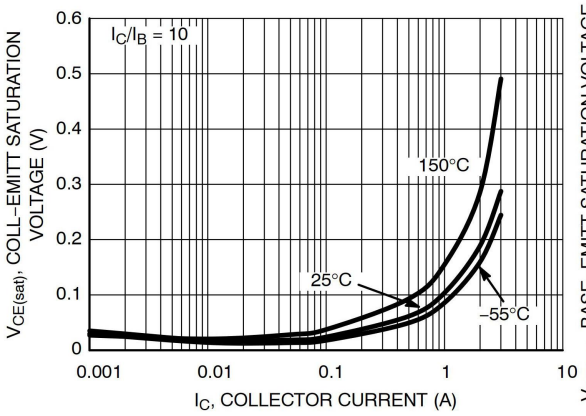

Figure 8. Collector−Emitter Saturation Voltage

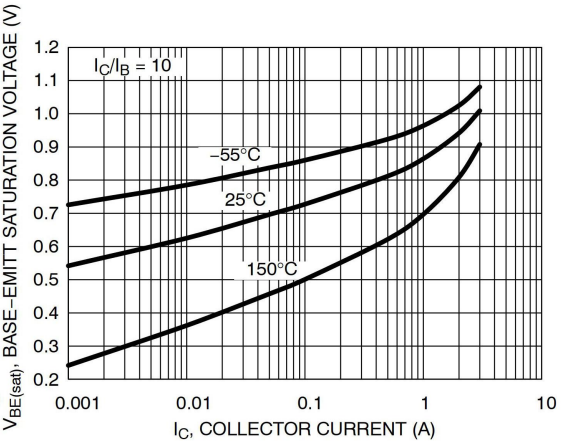

Figure 9. Base−Emitter Saturation Voltage

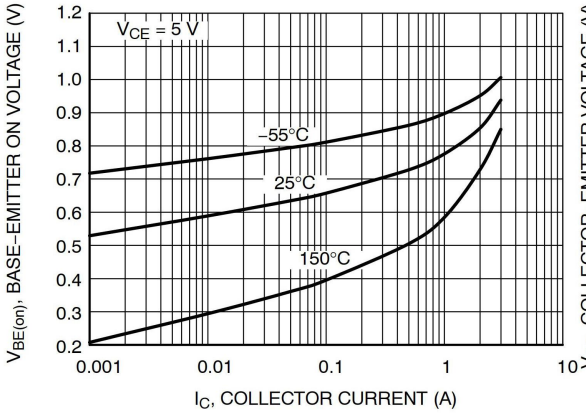

Figure 10. Base-Emitter "On" Voltage

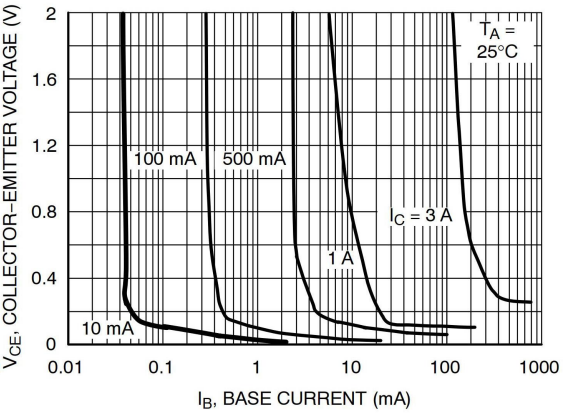

Figure 11. Collector Saturation Region

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TYPICAL CHARACTERISTICS – MJD31, MJD31C (NPN)

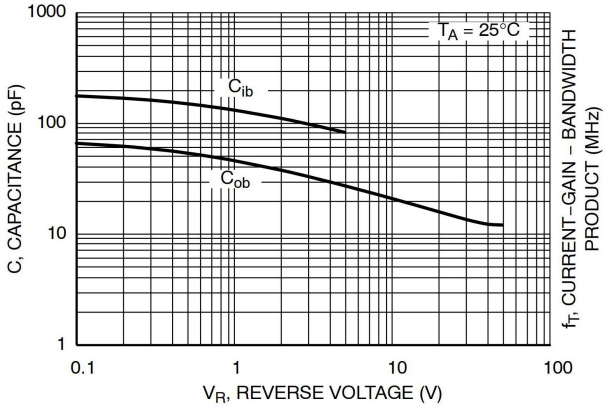

Figure 12. Capacitance

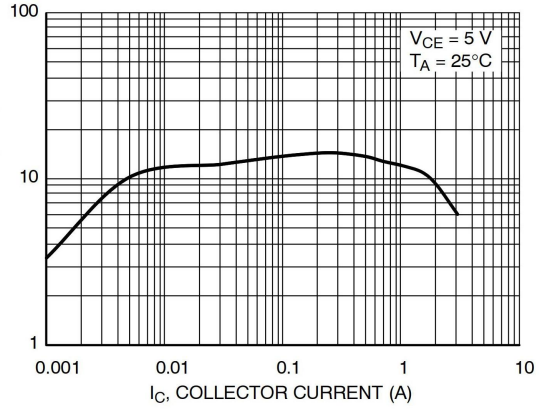

Figure 13. Current–Gain–Bandwidth Product

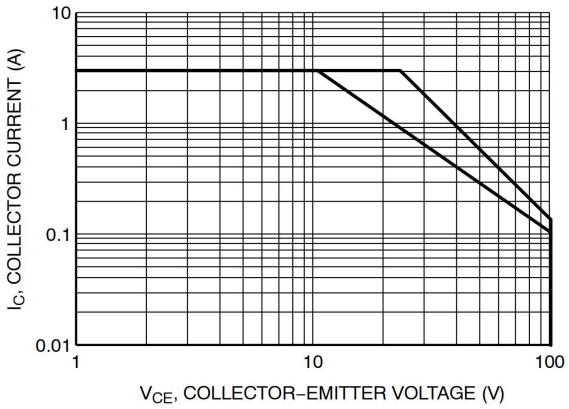

Figure 14. Safe Operating Area

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TYPICAL CHARACTERISTICS – MJD32, MJD32C (PNP)

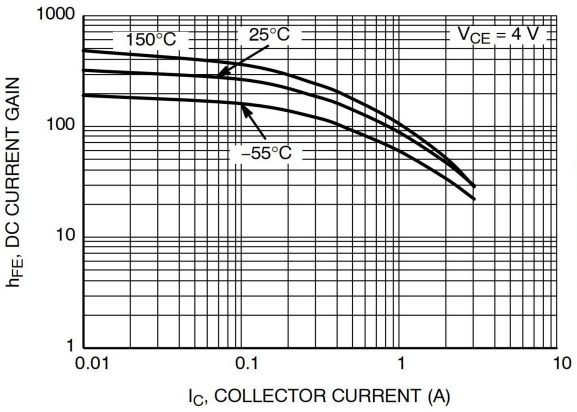

Figure 15. DC Current Gain at V_{CE} = 4 V

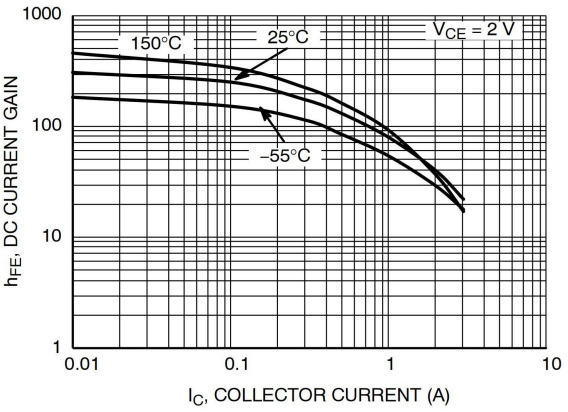

Figure 16. DC Current Gain at V_{CE} = 2 V

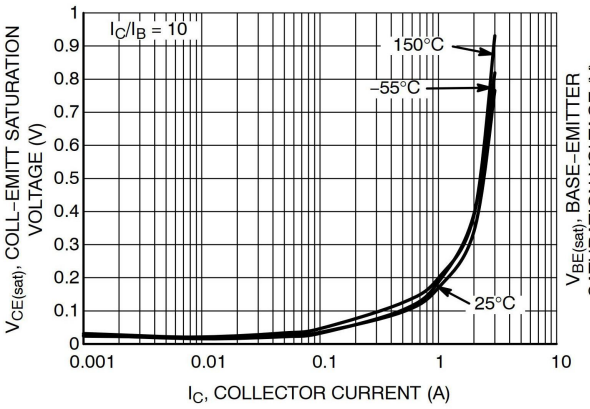

Figure 17. Collector−Emitter Saturation Voltage

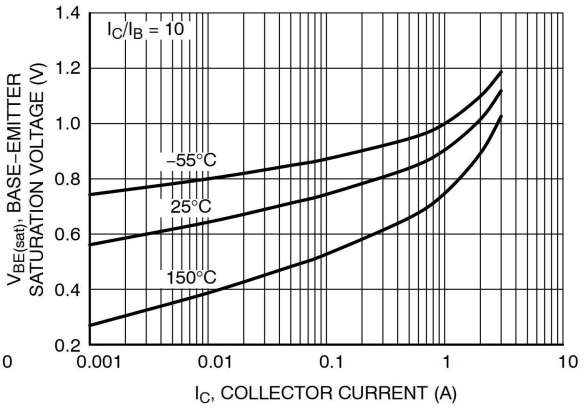

Figure 18. Base−Emitter Saturation Voltage

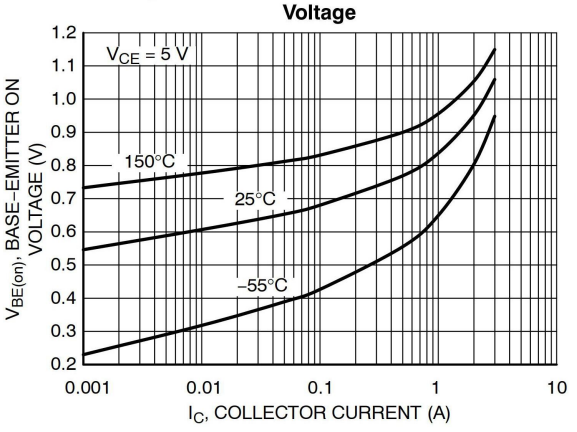

Figure 19. Base−Emitter "On" Voltage

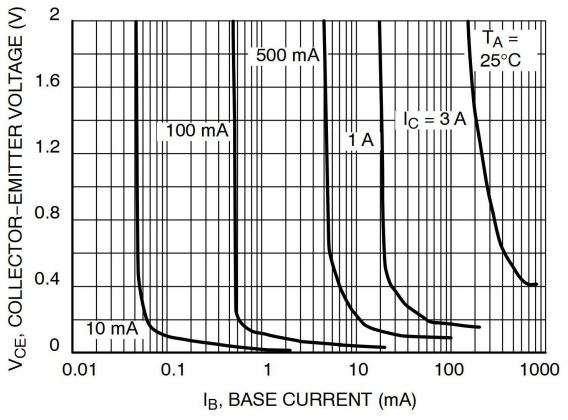

Figure 20. Collector Saturation Region

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TYPICAL CHARACTERISTICS

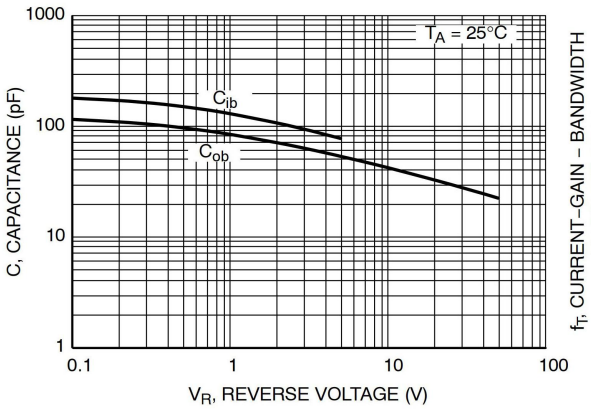

Figure 21. Capacitance

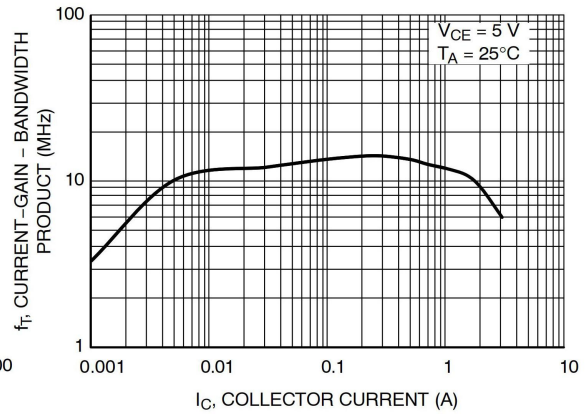

Figure 22. Current−Gain−Bandwidth Product

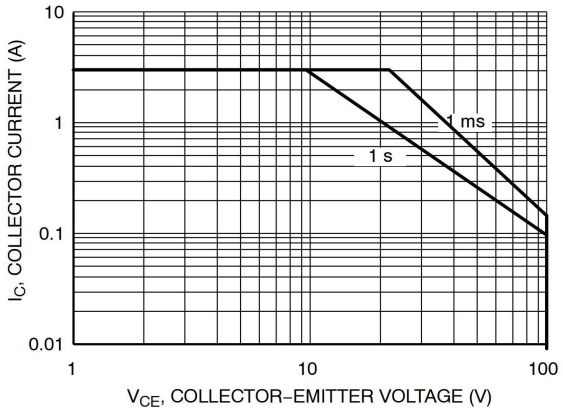

Figure 23. Safe Operating Area

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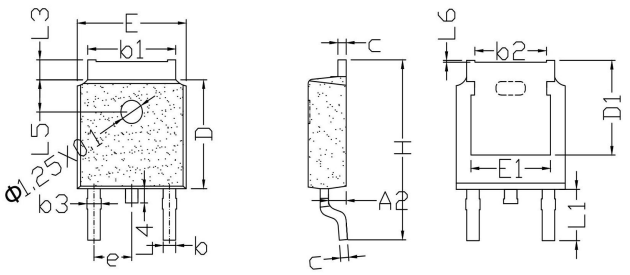
Ordering Information

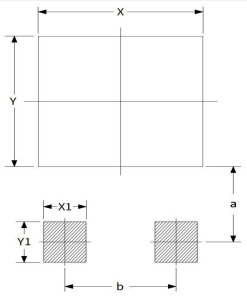
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TO-252	R3	0.305	2500	5000	25000	13''

Package Outline Dimensions (TO-252)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A2	0.90	1.10	0.035	0.043
b	0.66	0.86	0.026	0.034
b1	5.10	5.46	0.201	0.215
b2	4.27	4.37	0.168	0.172
b3	0.78	0.90	0.031	0.035
c	0.45	0.55	0.018	0.022
D	5.90	6.30	0.232	0.248
D1	5.35 REF.		0.211REF.	
E	6.30	6.70	0.248	0.264
E1	4.83 REF.		0.190 REF.	
e	2.18	2.38	0.086	0.094
H	9.80	10.4	0.386	0.409
L1	2.70	3.10	0.106	0.122
L3	0.80	1.20	0.031	0.047
L4	0.60	1.00	0.024	0.039
L5	1.8 REF.		0.071 REF.	
L6	-	0.12	-	0.005

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
a	3.70	-	0.146	-
b	4.37	-	0.172	-
X	-	5.80	-	0.228
X1	-	1.20	-	0.047
Y	-	5.85	-	0.230
Y1	-	2.00	-	0.079