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MJD122T4G,(NPN)
MJD127T4G (PNP)
Complementary Darlington Power Transistor

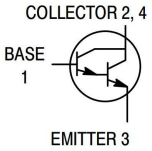
DPAK For Surface Mount Applications

Designed for general purpose amplifier and low speed switching applications.

SILICON
POWER TRANSISTOR
8 AMPERES
100 VOLTS, 20 WATTS



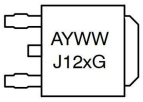
DPAK
CASE 369C
STYLE 1



Features

- Lead Formed for Surface Mount Applications in Plastic Sleeves
- Surface Mount Replacements for 2N6040–2N6045 Series, TIP120–TIP122 Series, and TIP125–TIP127 Series
- Monolithic Construction With Built–in Base–Emitter Shunt Resistors
- High DC Current Gain: h_{FE} = 2500 (Typ) @ I_C = 4.0 Adc
- Epoxy Meets UL 94 V–0 @ 0.125 in
- ESD Ratings:
  - Human Body Model, 3B > 8000 V
  - Machine Model, C > 400 V

MARKING DIAGRAM



A = Assembly Location
Y = Year
WW = Work Week
x = 2 or 7
G = Pb–Free Package

- Pb–Free Packages are Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	100	Vdc
Collector–Base Voltage	V_{CB}	100	Vdc
Emitter–Base Voltage	V_{EB}	5	Vdc
Collector Current Continuous Peak	I_C	 8 16	Adc
Base Current	I_B	120	mAdc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 20 0.16	W W/°C
Total Power Dissipation (Note 1) @ T_A = 25°C Derate above 25°C	P_D	 1.75 0.014	 W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	°C

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	$R_{\theta JC}$	 6.25	°C/W
Thermal Resistance Junction–to–Ambient (Note1)	$R_{\theta JA}$	 71.4	°C/W

1. 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 (I_C = 30 mAdc, I_B = 0)	$V_{CEO(sus)}$	100	–	Vdc
Collector Cutoff Current (V_{CE} = 50 Vdc, I_B = 0)	I_{CEO}	–	10	μAdc
Collector Cutoff Current (V_{CB} = 100 Vdc, I_E = 0)	I_{CBO}	–	10	μAdc
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)	I_{EBO}	–	2	mAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 4 Adc, V_{CE} = 4 Vdc) (I_C = 8 Adc, V_{CE} = 4 Vdc)	h_{FE}	1000 100	12,000 –	–
Collector–Emitter Saturation Voltage (I_C = 4 Adc, I_B = 16 mAdc) (I_C = 8 Adc, I_B = 80 mAdc)	$V_{CE(sat)}$	– –	2 4	Vdc
Base–Emitter Saturation Voltage (Note 2) (I_C = 8 Adc, I_B = 80 mAdc)	$V_{BE(sat)}$	–	4.5	Vdc
Base–Emitter On Voltage (I_C = 4 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	–	2.8	Vdc
DYNAMIC CHARACTERISTICS				
Current–Gain–Bandwidth Product (I_C = 3 Adc, V_{CE} = 4 Vdc, f = 1 MHz)	$\|h_{fe}\|$	4	–	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz) MJD127T4G MJD122T4G	C_{ob}	– –	300 200	pF
Small–Signal Current Gain (I_C = 3 Adc, V_{CE} = 4 Vdc, f = 1 kHz)	h_{fe}	300	–	–

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

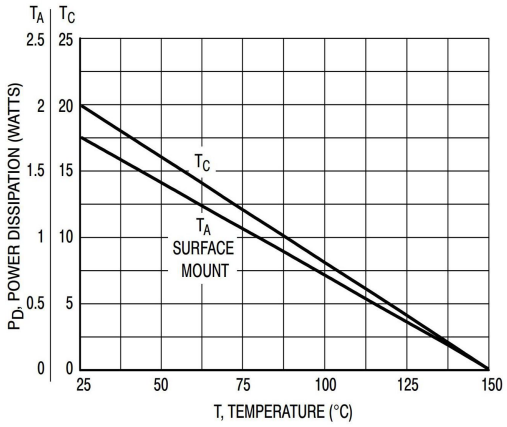
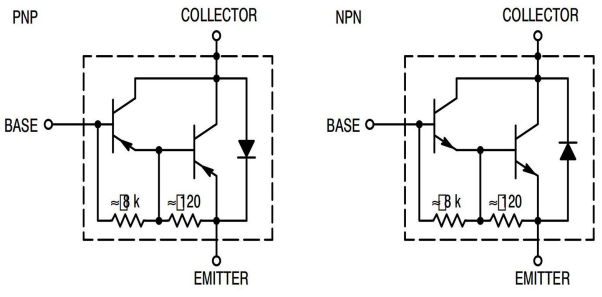


Figure 1. Power Derating



Darlington Schematic

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TYPICAL ELECTRICAL CHARACTERISTICS

PNP MJD127 **NPN MJD122**

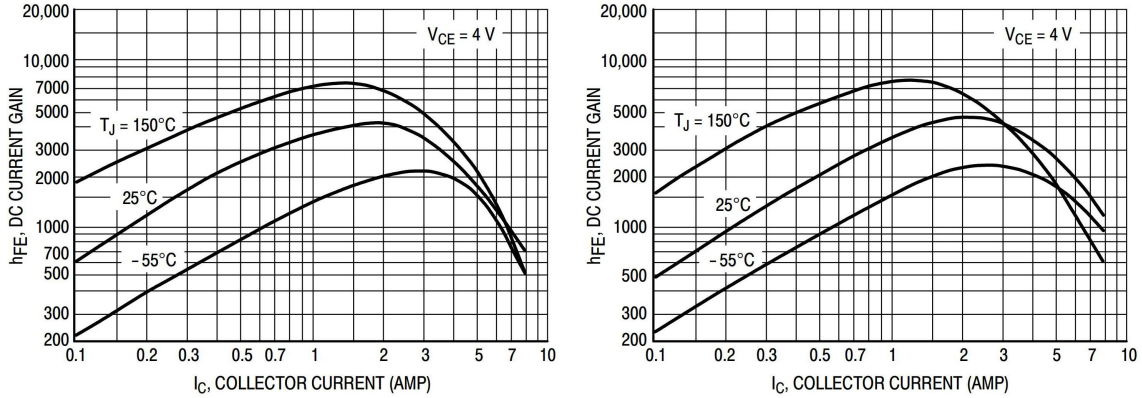

Figure 2. DC Current Gain

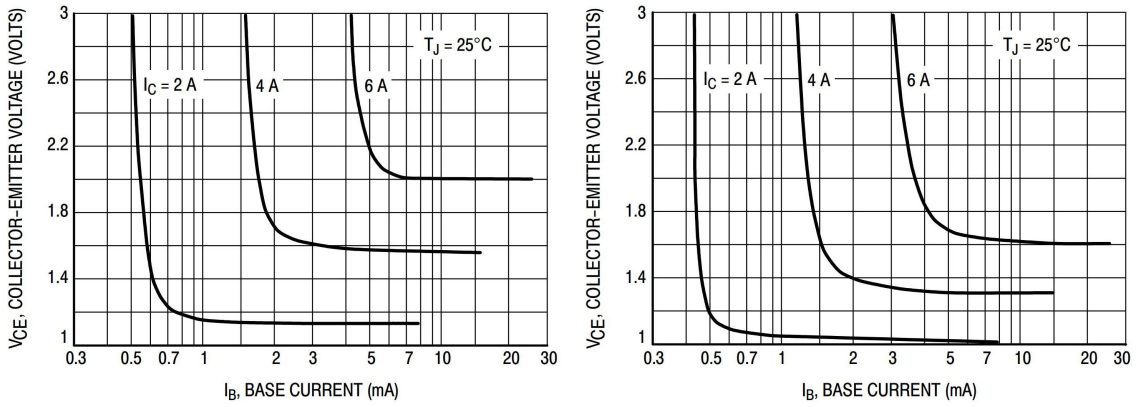

Figure 3. Collector Saturation Region

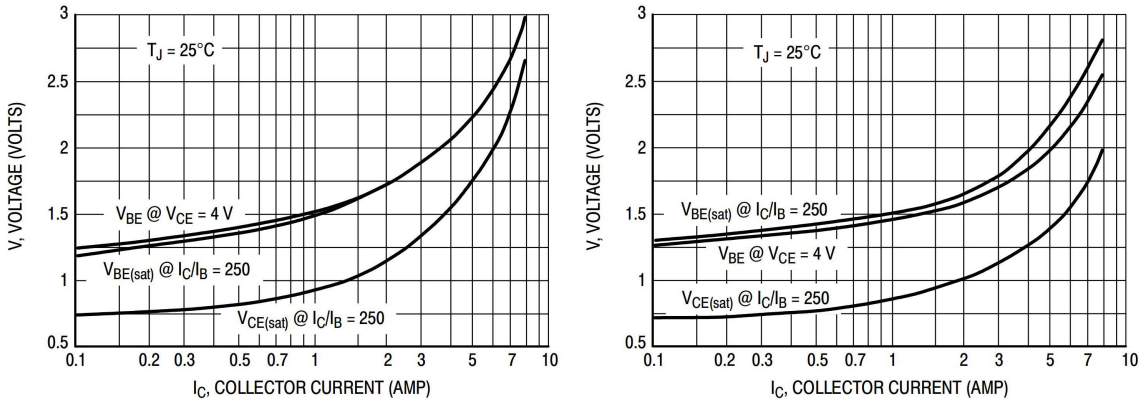

Figure 4. "On" Voltages

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TYPICAL ELECTRICAL CHARACTERISTICS

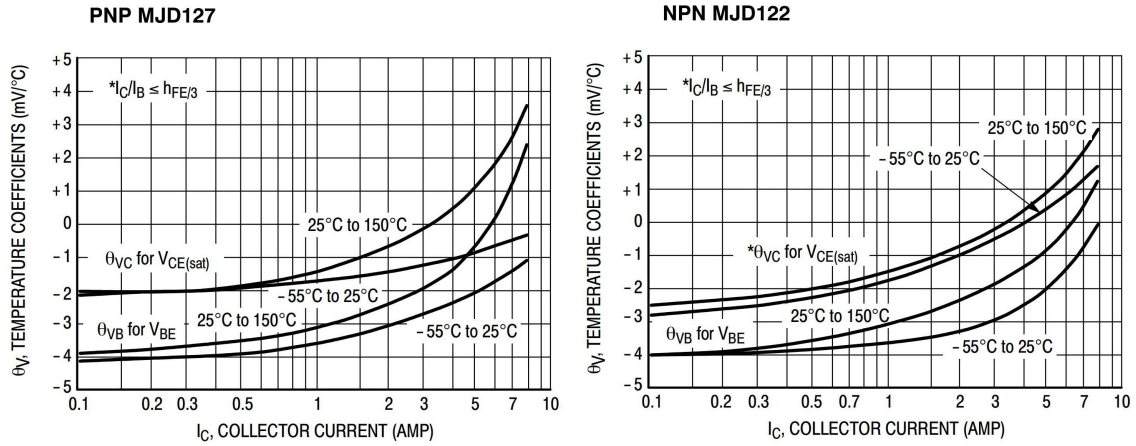

Figure 5. Temperature Coefficients

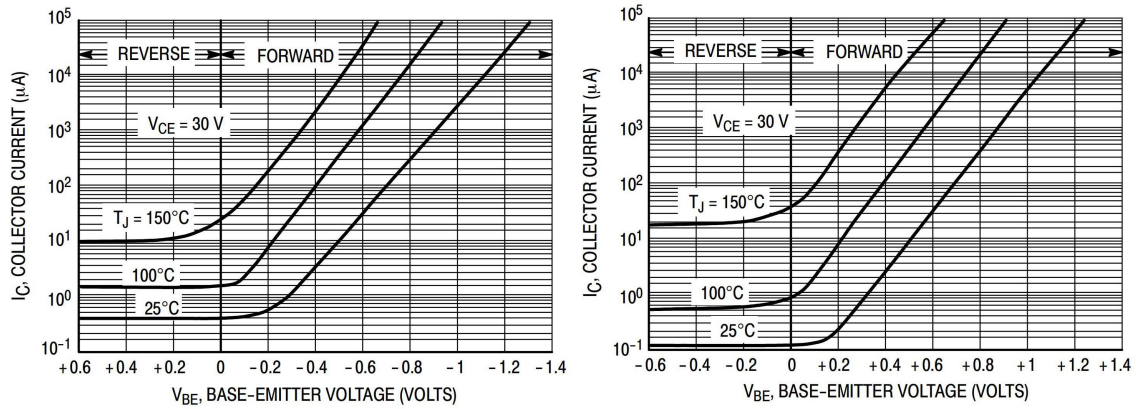

Figure 6. Collector Cut−Off Region

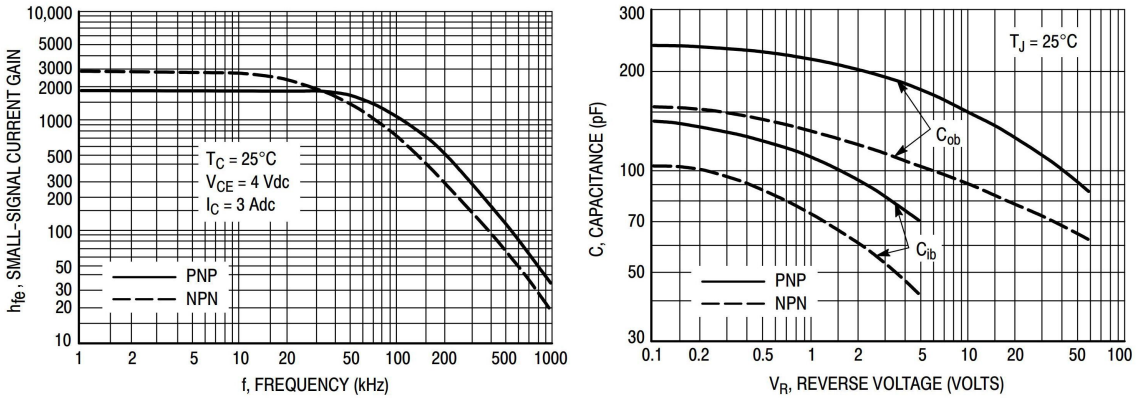

Figure 7. Small−Signal Current Gain

Figure 8. Capacitance

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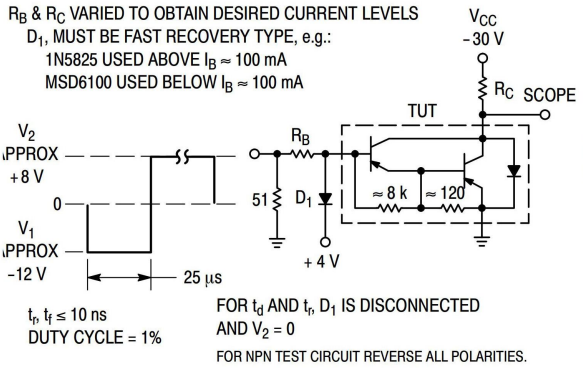

Figure 9. Switching Times Test Circuit

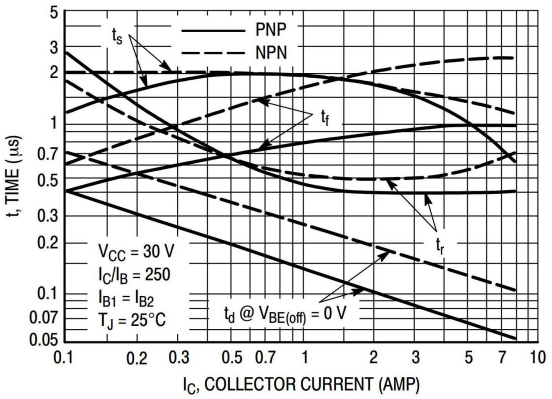

Figure 10. Switching Times

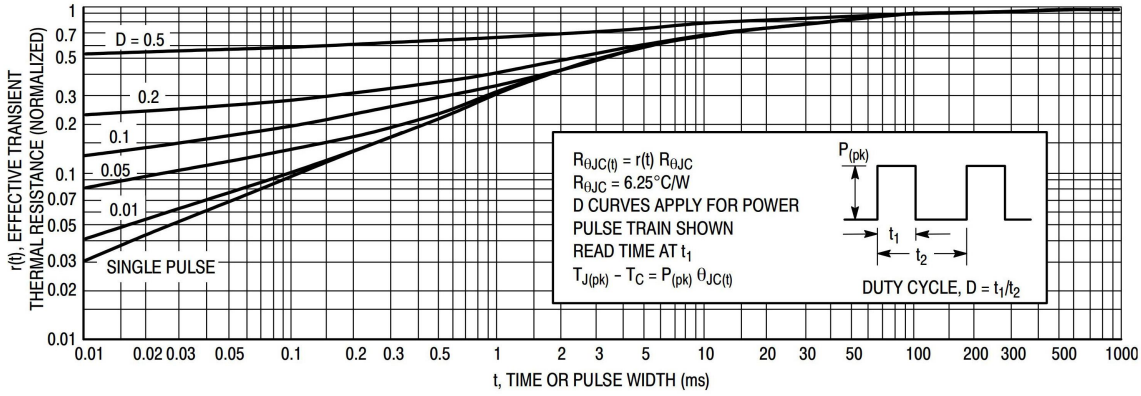

Figure 11. Thermal Response

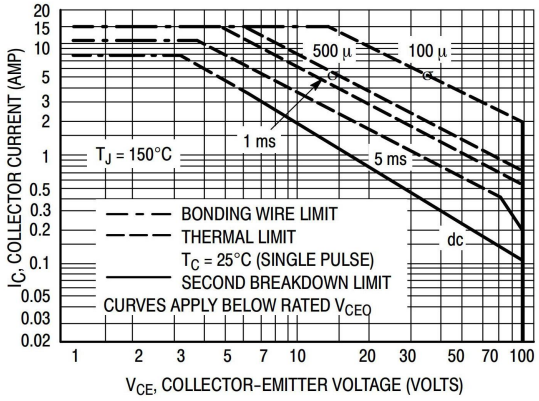

Figure 12. Maximum Forward Bias Safe Operating rea

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 12 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 $T_{J(pk)} < 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 11. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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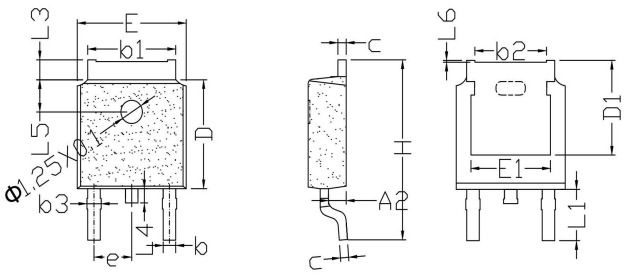
Ordering Information

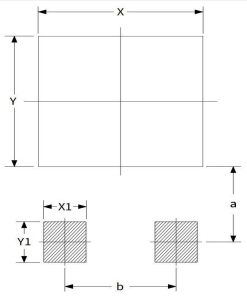
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TO-252	R3	0.305	2500	5000	25000	13''

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