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OM SENI

MJD200T4G (NPN),
MJD210T4G (PNP)

Complementary Plastic Power Transistors

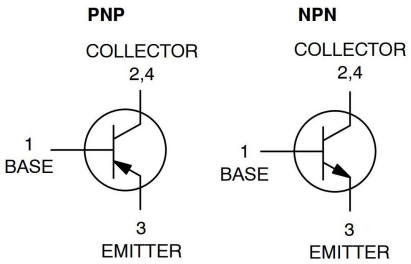
NPN/PNP Silicon DPAK For Surface Mount Applications

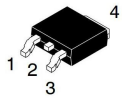
Designed for low voltage, low−power, high−gain audio amplifier applications.

SILICON
POWER TRANSISTORS
5 AMPERES
25 VOLTS, 12.5 WATTS

Features

- High DC Current Gain
- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- Low Collector−Emitter Saturation Voltage
- High Current−Gain − Bandwidth Product
- Annular Construction for Low Leakage
- Epoxy Meets UL 94 V−0 @ 0.125 in





DPAK
CASE 369C
STYLE 1

- These Devices are Pb−Free and are RoHS Compliant

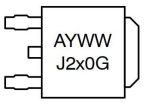
MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector−Base Voltage	V_{CB}	40	Vdc
Collector−Emitter Voltage	V_{CEO}	25	Vdc
Emitter−Base Voltage	V_{EB}	8.0	Vdc
Collector Current − Continuous	I_C	5.0	Adc
Collector Current − Peak	I_{CM}	10	Adc
Base Current	I_B	1.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 12.5 0.1	 W W/°C
Total Power Dissipation (Note 1) @ T_A = 25°C Derate above 25°C	P_D	 1.4 0.011	 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.

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

MARKING DIAGRAM



A = Assembly Location
Y = Year
WW = Work Week
x = 1 or 0
G = Pb−Free Package

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	10	°C/W
Thermal Resistance, Junction−to−Ambient (Note 2)	$R_{\theta JA}$	89.3	°C/W

2. 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 3) (I_C = 10 mAdc, I_B = 0)	$V_{CEO(sus)}$	25	–	Vdc
Collector Cutoff Current (V_{CB} = 40 Vdc, I_E = 0) (V_{CB} = 40 Vdc, I_E = 0, T_J = 125°C)	I_{CBO}	– –	100 100	nAdc μAdc
Emitter Cutoff Current (V_{BE} = 8 Vdc, I_C = 0)	I_{EBO}	–	100	nAdc
ON CHARACTERISTICS				
C Current Gain (Note 3), (I_C = 500 mAdc, V_{CE} = 1 Vdc) (I_C = 2 Adc, V_{CE} = 1 Vdc) (I_C = 5 Adc, V_{CE} = 2 Vdc)	h_{FE}	70 45 10	– 180 –	–
Collector–Emitter Saturation Voltage (Note 3) (I_C = 500 mAdc, I_B = 50 mAdc) (I_C = 2 Adc, I_B = 200 mAdc) (I_C = 5 Adc, I_B = 1 Adc)	$V_{CE(sat)}$	– – –	0.3 0.75 1.8	Vdc
Base–Emitter Saturation Voltage (Note 3) (I_C = 5 Adc, I_B = 1 Adc)	$V_{BE(sat)}$	–	2.5	Vdc
Base–Emitter On Voltage (Note 3) (I_C = 2 Adc, V_{CE} = 1 Vdc)	$V_{BE(on)}$	–	1.6	Vdc
DYNAMIC CHARACTERISTICS				
Current–Gain – Bandwidth Product (Note 4) (I_C = 100 mAdc, V_{CE} = 10 Vdc, f_{test} = 10 MHz)	f_T	65	–	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz) MJD200T4G MJD210T4G	C_{ob}	– –	80 120	pF

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

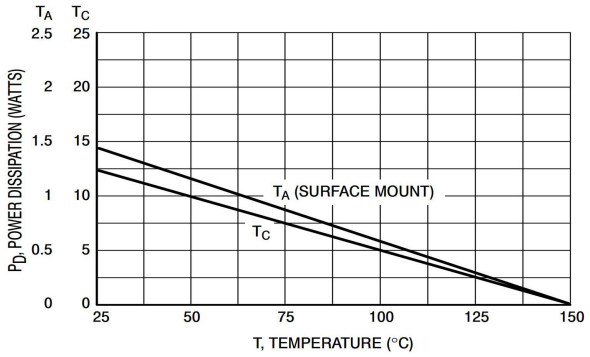

Figure 1. Power Derating

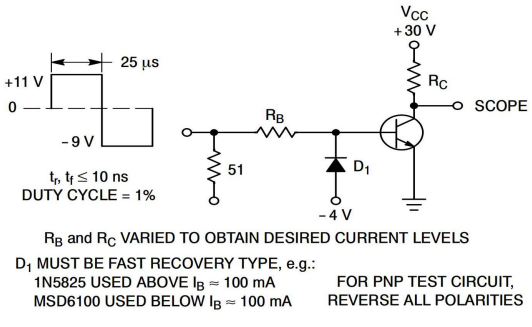

Figure 2. Switching Time Test Circuit

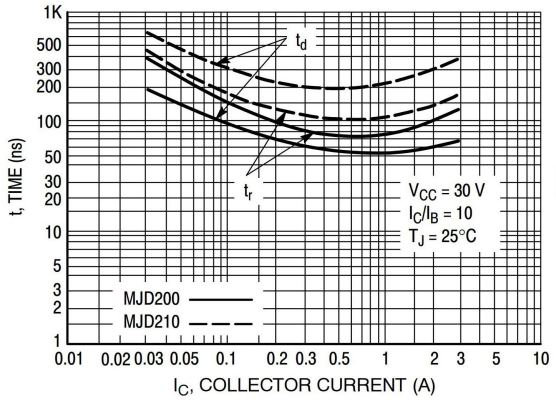

Figure 3. Turn–On Time

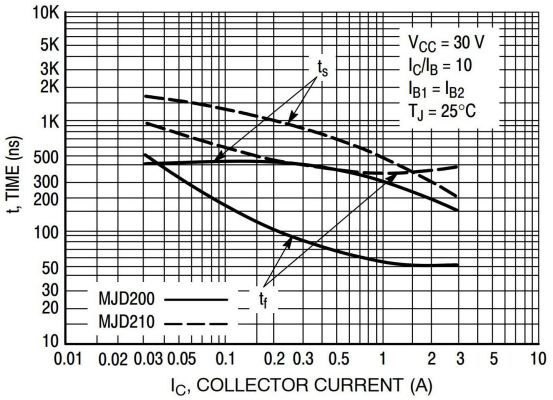

Figure 4. Turn–Off Time

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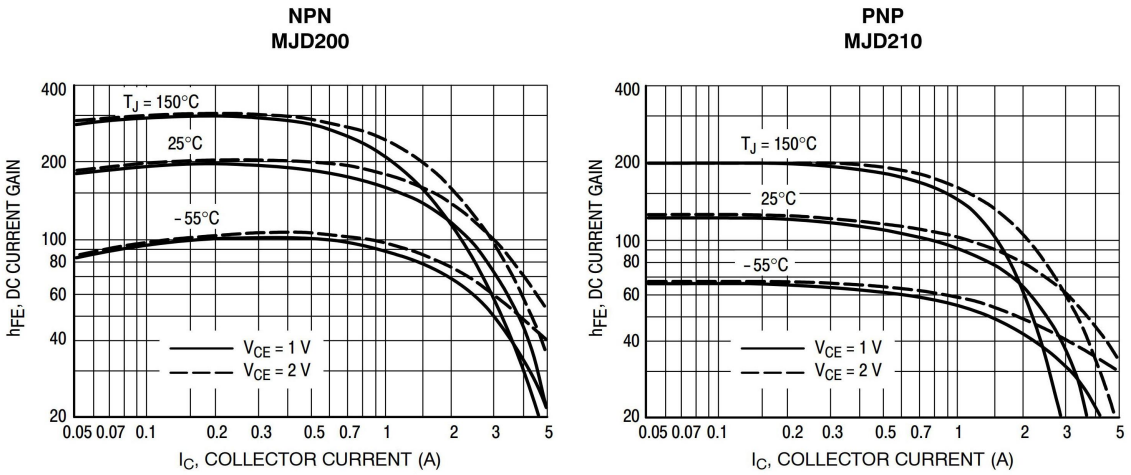

Figure 5. DC Current Gain

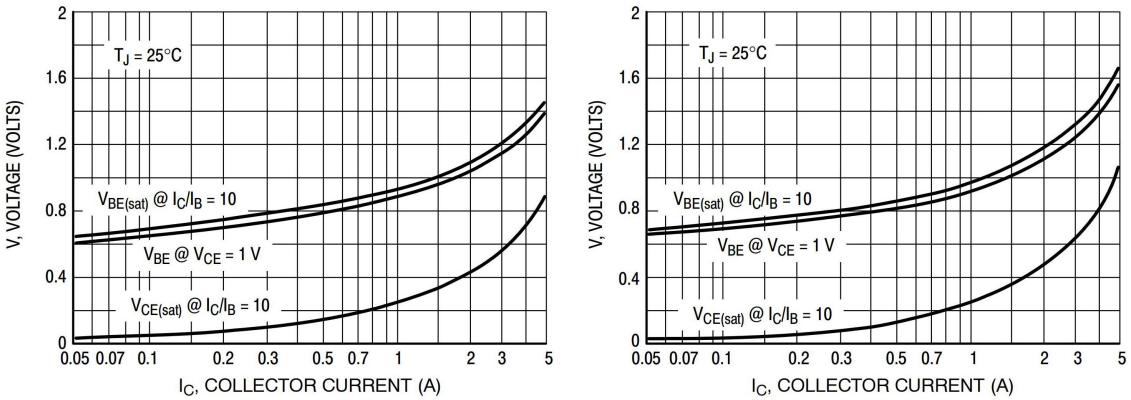

Figure 6. "On" Voltage

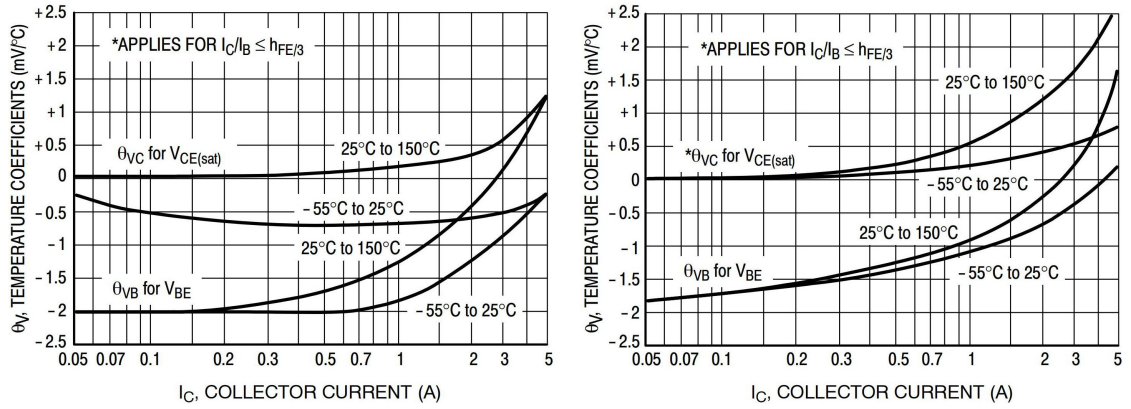

Figure 7. Temperature Coefficients

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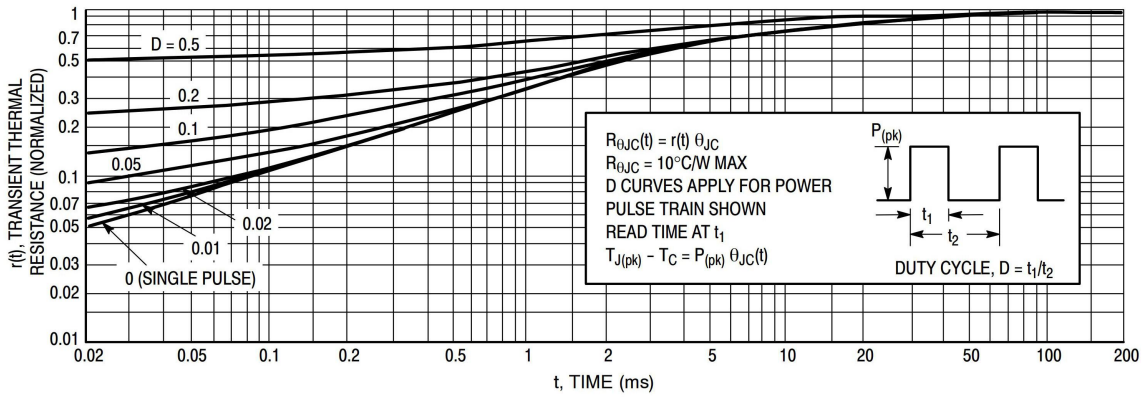

Figure 8. Thermal Response

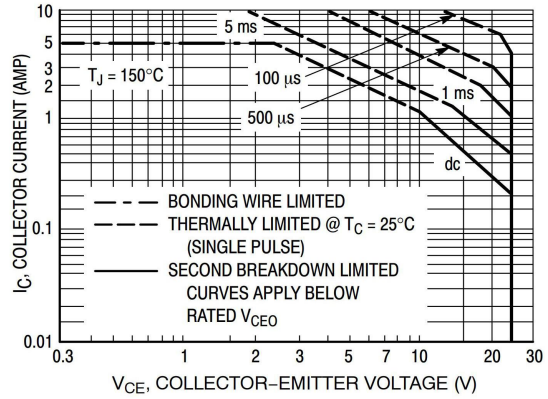

Figure 9. Active Region Safe Operating Area

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 9 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 8. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

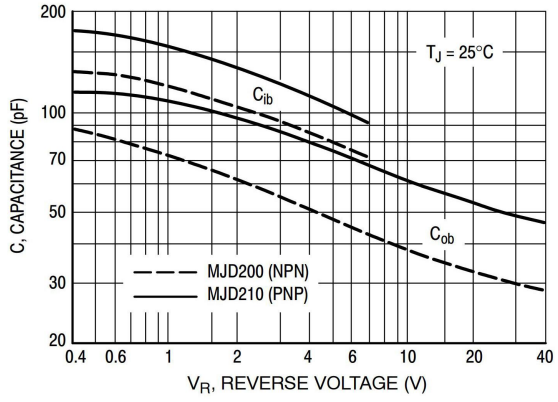

Figure 10. Capacitance

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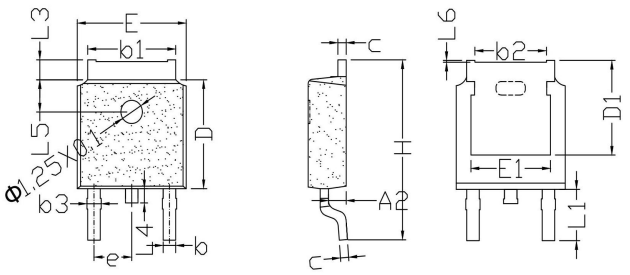
Ordering Information

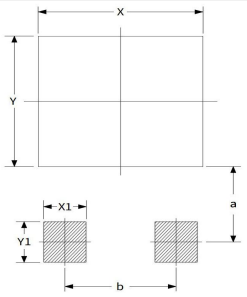
PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
TO-252	R3	0.305	2500	5000	25000	13''

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