2N5655G, 2N5657G

Plastic NPN Silicon High-Voltage Power Transistors

These devices are designed for use in line−operated equipment such as audio output amplifiers; low−current, high−voltage converters; and AC line relays.

Features

- Excellent DC Current Gain
- High Current−Gain − Bandwidth Product
- These Devices are Pb−Free and are RoHS Compliant*

MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Collector−Emitter Voltage 2N5655G 2N5657G	V_{CEO}	 250 350	Vdc
Collector−Base Voltage 2N5655G 2N5657G	V_{CB}	 275 375	Vdc
Emitter−Base Voltage	V_{EB}	6.0	Vdc
Collector Current − Continuous	I_C	0.5	Adc
Collector Current − Peak	I_{CM}	1.0	Adc
Base Current	I_B	1.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 20 0.16	 W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C/W

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. Indicates JEDEC registered data.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	6.25	°C/W

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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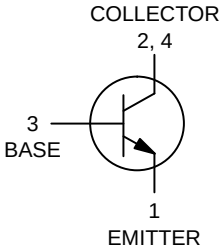
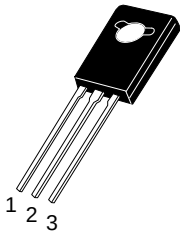
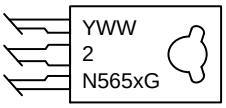
0.5 AMPERE POWER TRANSISTORS NPN SILICON 250−350 VOLTS, 20 WATTS





TO−225
CASE 77−09
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
2N565x = Device Code
x = 5 or 7
G = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping
2N5655G	TO−225 (Pb−Free)	500 Units / Bulk
2N5657G	TO−225 (Pb−Free)	500 Units / Bulk

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted) (Note 2)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (I_C = 100 mAdc (inductive), L = 50 mH)	$V_{CEO(sus)}$			Vdc
2N5655G		250	−	
2N5657G		350	−	
Collector−Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$			Vdc
2N5655G		250	−	
2N5657G		350	−	
Collector Cutoff Current (V_{CE} = 150 Vdc, I_B = 0)	I_{CEO}			mAdc
2N5655G		−	0.1	
(V_{CE} = 250 Vdc, I_B = 0)				
2N5657G		−	0.1	
Collector Cutoff Current (V_{CE} = 250 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	I_{CEX}			mAdc
2N5655G		−	0.1	
(V_{CE} = 350 Vdc, $V_{EB(off)}$ = 1.5 Vdc)				
2N5657G		−	0.1	
(V_{CE} = 150 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 100°C)				
2N5655G		−	1.0	
(V_{CE} = 250 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 100°C)				
2N5657G		−	1.0	
Collector Cutoff Current (V_{CB} = 275 Vdc, I_E = 0)	I_{CBO}			μAdc
2N5655G		−	10	
(V_{CB} = 375 Vdc, I_E = 0)				
2N5657G		−	10	
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)	I_{EBO}	−	10	μAdc
ON CHARACTERISTICS				
DC Current Gain (Note 3)	h_{FE}			−
(I_C = 50 mAdc, V_{CE} = 10 Vdc)		25	−	
(I_C = 100 mAdc, V_{CE} = 10 Vdc)		30	250	
(I_C = 250 mAdc, V_{CE} = 10 Vdc)		15	−	
(I_C = 500 mAdc, V_{CE} = 10 Vdc)		5.0	−	
Collector−Emitter Saturation Voltage (Note 3)	$V_{CE(sat)}$			Vdc
(I_C = 100 mAdc, I_B = 10 mAdc)		−	1.0	
(I_C = 250 mAdc, I_B = 25 mAdc)		−	2.5	
(I_C = 500 mAdc, I_B = 100 mAdc)		−	10	
Base−Emitter Voltage (I_C = 100 mAdc, V_{CE} = 10 Vdc) (Note 3)	V_{BE}	−	1.0	Vdc
DYNAMIC CHARACTERISTICS				
Current−Gain − Bandwidth Product (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 10 MHz) (Note 4)	f_T	10	−	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)	C_{ob}	−	25	pF
Small−Signal Current Gain (I_C = 100 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)	h_{fe}	20	−	−

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.

2. Indicates JEDEC registered data for 2N5655 Series.
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
4. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

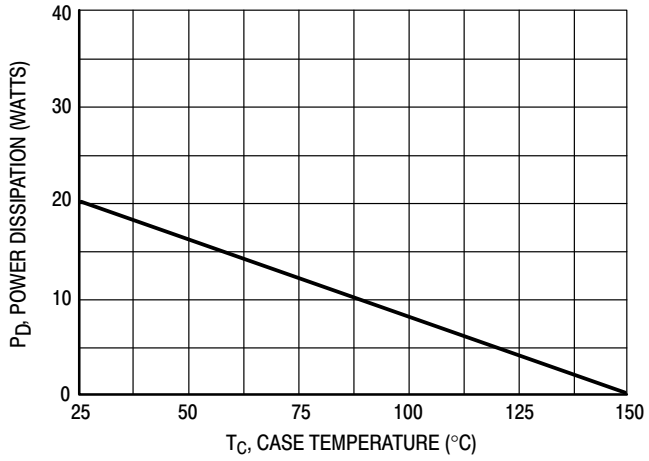


Figure 1. Power Derating

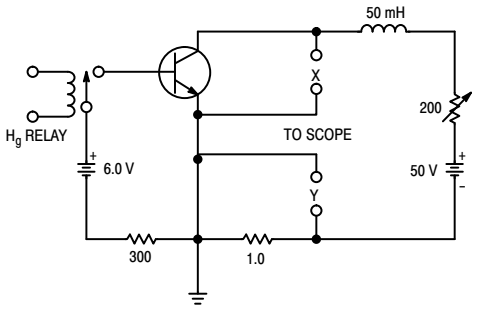


Figure 2. Sustaining Voltage Test Circuit

Safe Area Limits are indicated by Figures 3 and 4. Both limits are applicable and must be observed.

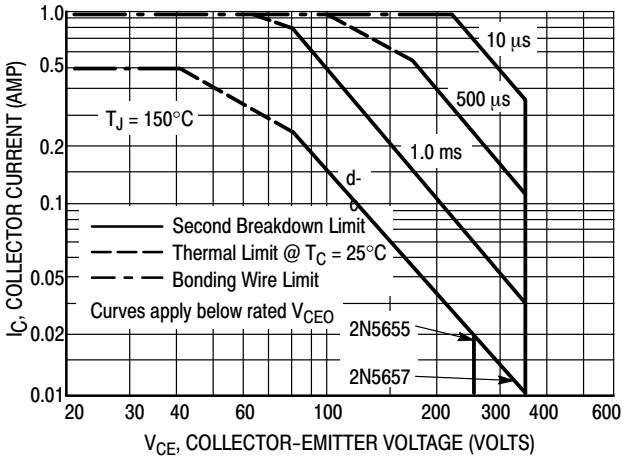


Figure 3. Active−Region Safe Operating Area

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 3 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 $T_{J(pk)} \leq 150°C$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

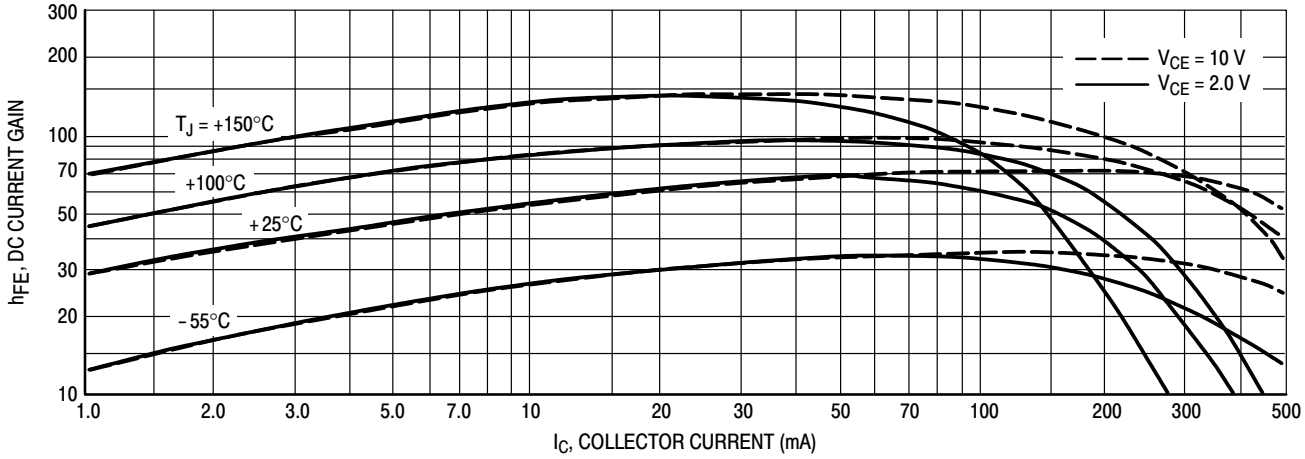


Figure 4. Current Gain

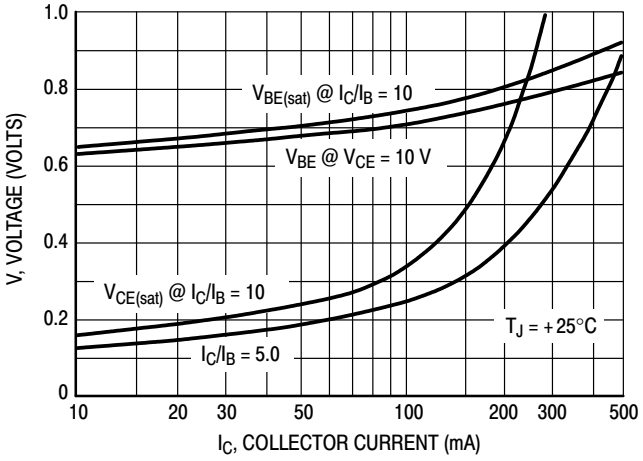


Figure 5. “On” Voltages

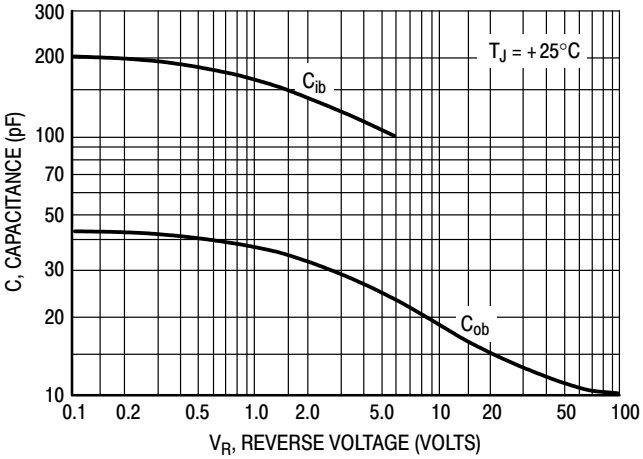


Figure 6. Capacitance

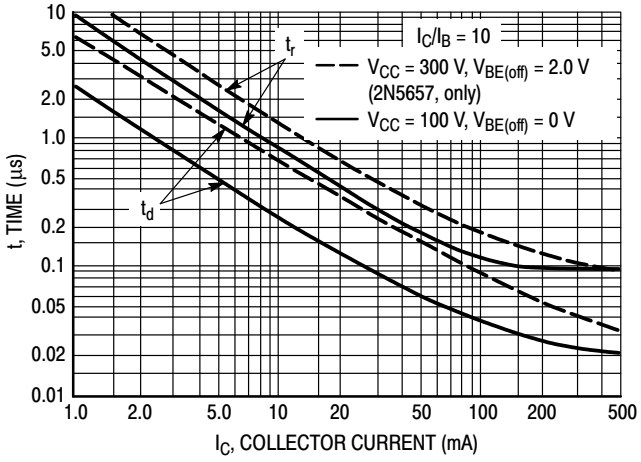


Figure 7. Turn−On Time

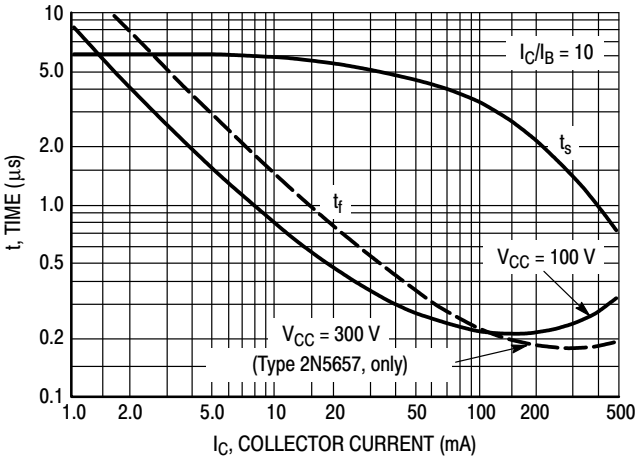
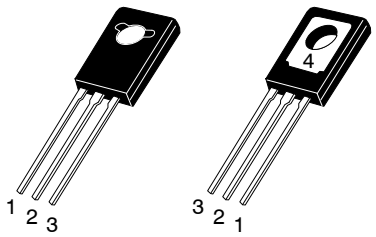


Figure 8. Turn−Off Time



FRONT VIEW **BACK VIEW**

TO−225
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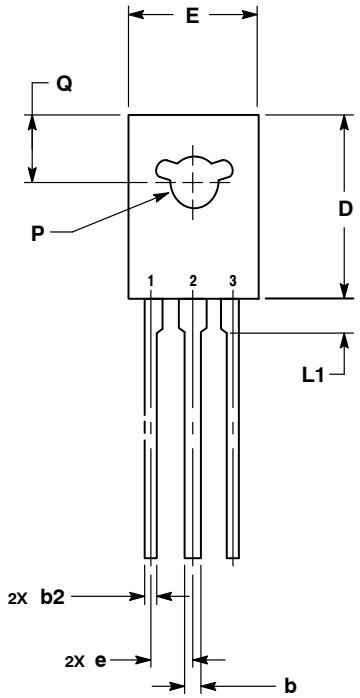
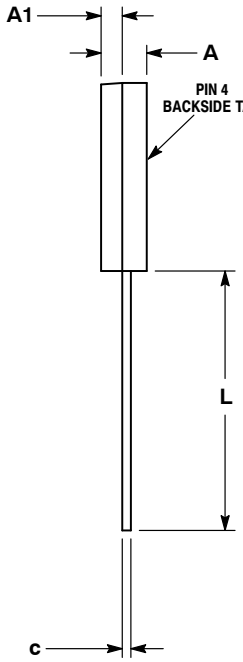
DATE 25 MAR 2015

SCALE 1:1



FRONT VIEW

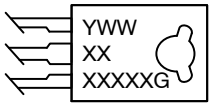


SIDE VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. NUMBER AND SHAPE OF LUGS OPTIONAL.

	MILLIMETERS	
DIM	MIN	MAX
A	2.40	3.00
A1	1.00	1.50
b	0.60	0.90
b2	0.51	0.88
c	0.39	0.63
D	10.60	11.10
E	7.40	7.80
e	2.04	2.54
L	14.50	16.63
L1	1.27	2.54
P	2.90	3.30
Q	3.80	4.20

GENERIC MARKING DIAGRAM*



Y = Year
WW = Work Week
XXXXX = Device Code
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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

STYLE 2:
PIN 1. CATHODE
2., 4. ANODE
3. GATE

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

STYLE 4:
PIN 1. ANODE 1
2., 4. ANODE 2
3. GATE

STYLE 5:
PIN 1. MT 1
2., 4. MT 2
3. GATE

STYLE 6:
PIN 1. CATHODE
2., 4. GATE
3. ANODE

STYLE 7:
PIN 1. MT 1
2., 4. GATE
3. MT 2

STYLE 8:
PIN 1. SOURCE
2., 4. GATE
3. DRAIN

STYLE 9:
PIN 1. GATE
2., 4. DRAIN
3. SOURCE

STYLE 10:
PIN 1. SOURCE
2., 4. DRAIN
3. GATE

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