

2N5657G Datasheet



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	2N5657G-DG
Manufacturer	onsemi
Manufacturer Product Number	2N5657G
Description	TRANS NPN 350V 0.5A TO126
Detailed Description	Bipolar (BJT) Transistor NPN 350 V 500 mA 10MHz 20 W Through Hole TO-126



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DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

2N5657G

Series:

-

Transistor Type:

NPN

Voltage - Collector Emitter Breakdown (Max):

350 V

Current - Collector Cutoff (Max):

100µA

Power - Max:

20 W

Operating Temperature:

-65°C ~ 150°C (TJ)

Package / Case:

TO-225AA, TO-126-3

Base Product Number:

2N5657

Manufacturer:

onsemi

Product Status:

Obsolete

Current - Collector (Ic) (Max):

500 mA

Vce Saturation (Max) @ Ib, Ic:

10V @ 100mA, 500mA

DC Current Gain (hFE) (Min) @ Ic, Vce:

30 @ 100mA, 10V

Frequency - Transition:

10MHz

Mounting Type:

Through Hole

Supplier Device Package:

TO-126

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

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 @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	20 0.16	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ\text{C/W}$

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

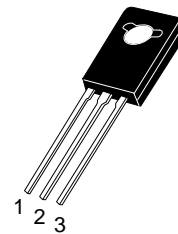
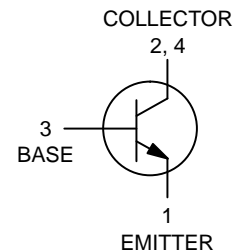
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	6.25	$^\circ\text{C/W}$



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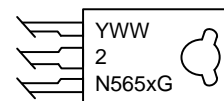
<http://onsemi.com>

**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

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

2N5655G, 2N5657G**ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$ unless otherwise noted) (Note 2)

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

- Indicates JEDEC registered data for 2N5655 Series.
- Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.
- f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

2N5655G, 2N5657G

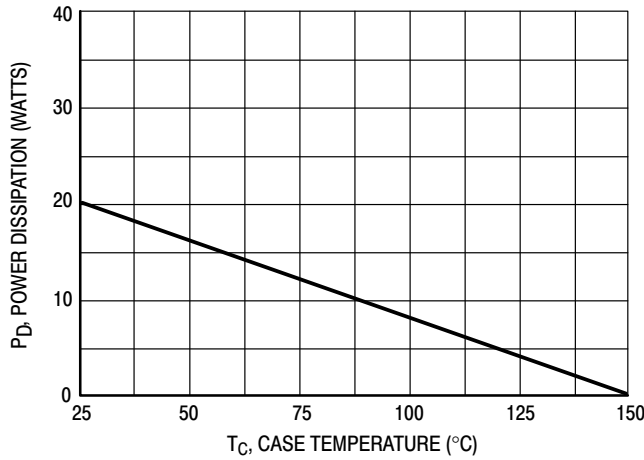


Figure 1. Power Derating

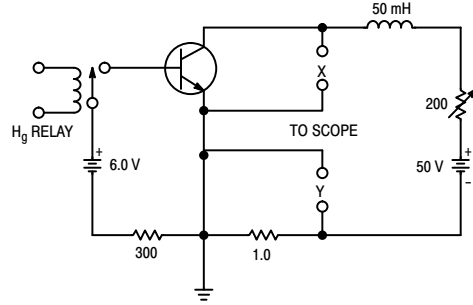


Figure 2. Sustaining Voltage Test Circuit

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

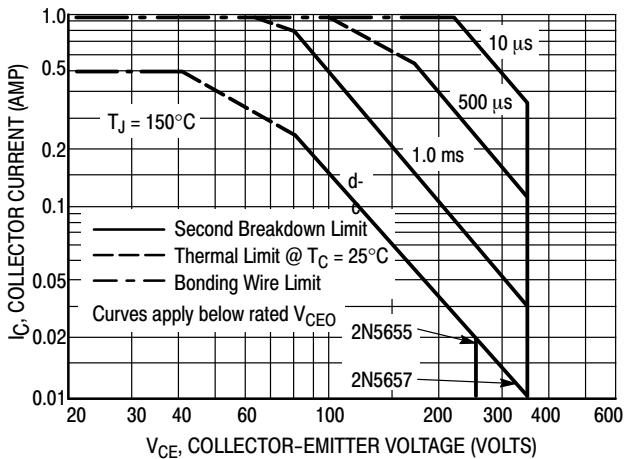


Figure 3. Active-Region Safe Operating Area

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 $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

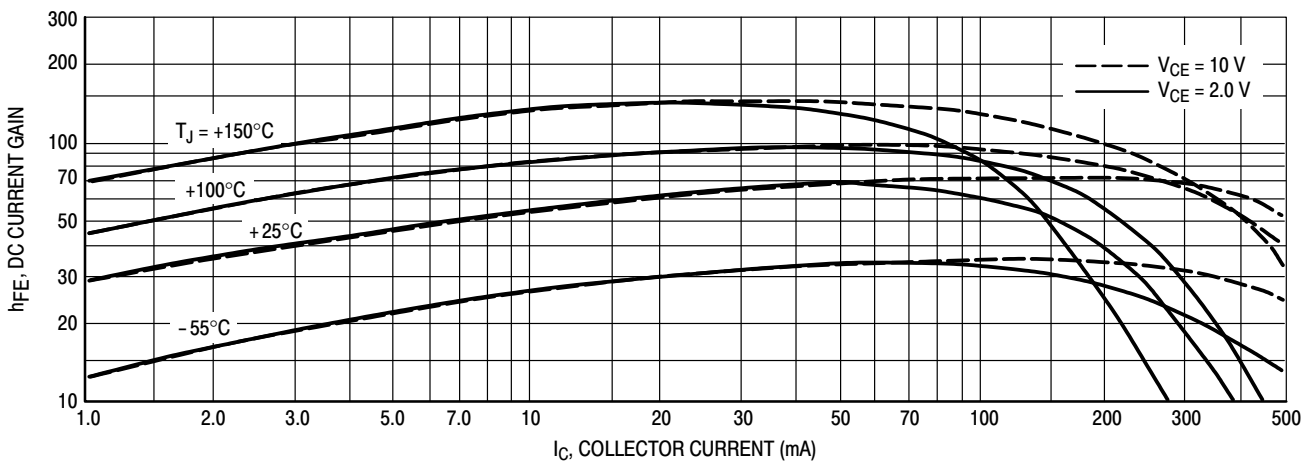


Figure 4. Current Gain

2N5655G, 2N5657G

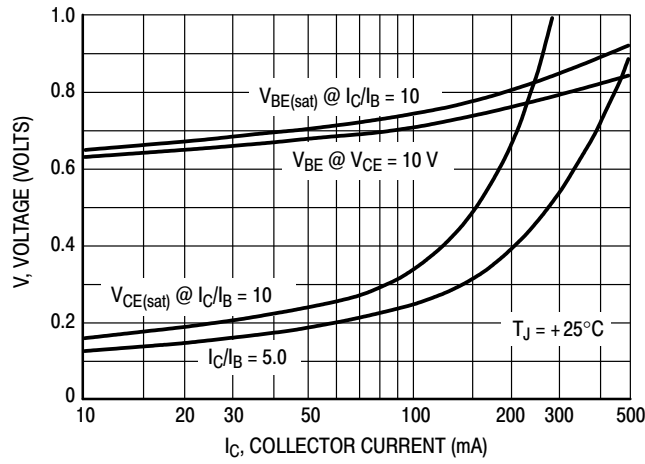


Figure 5. "On" Voltages

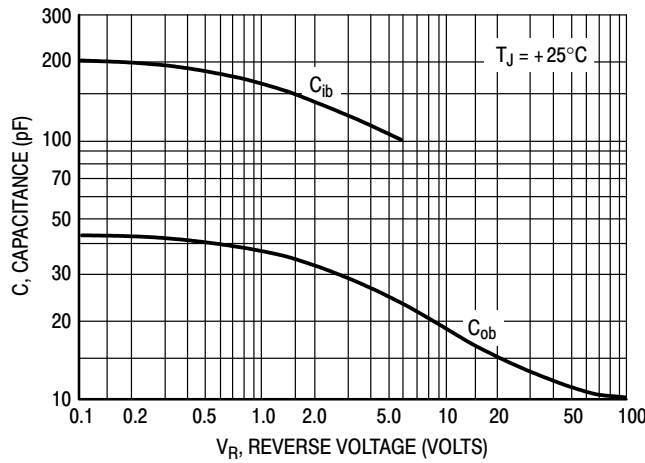


Figure 6. Capacitance

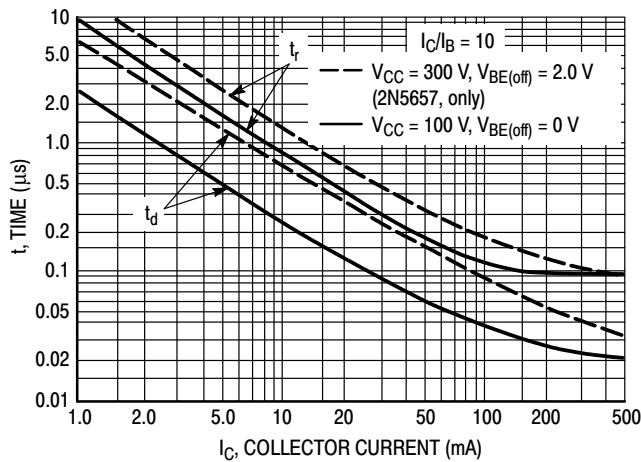


Figure 7. Turn-On Time

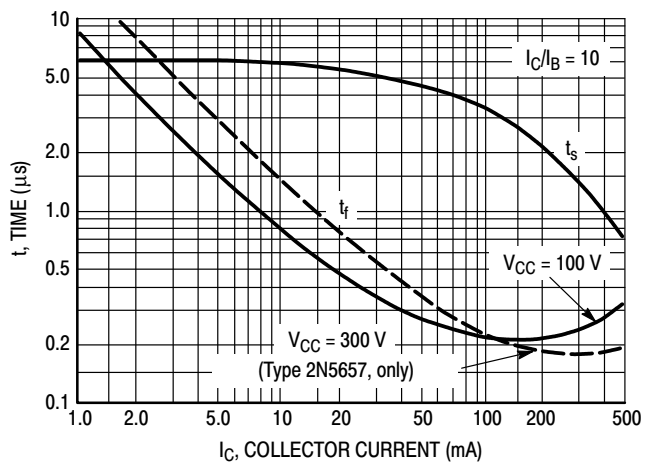
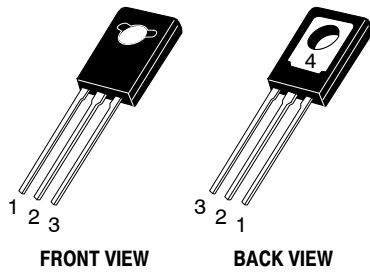


Figure 8. Turn-Off Time



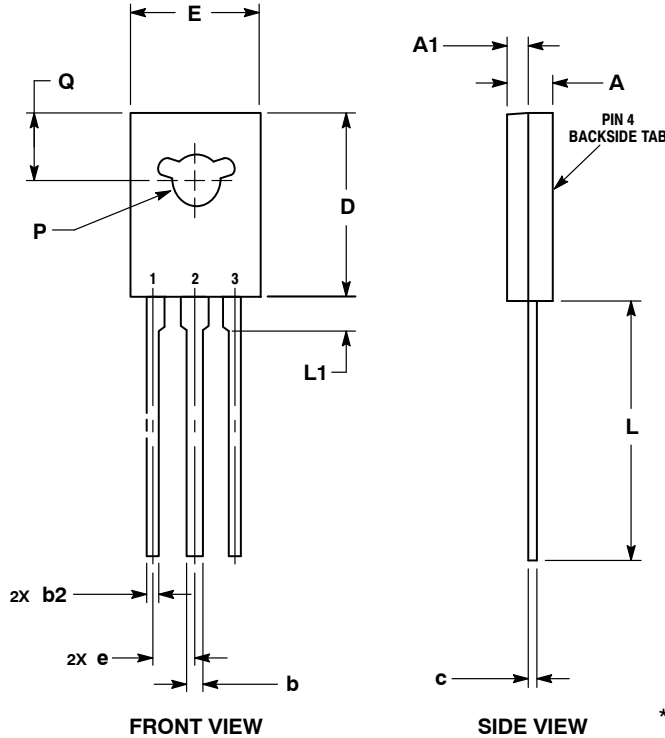
**MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS**



**TO-225
CASE 77-09
ISSUE AD**

DATE 25 MAR 2015

SCALE 1:1

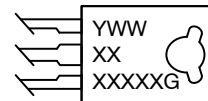


NOTES:

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.

<p>STYLE 1: PIN 1. EMITTER 2., 4. COLLECTOR 3. BASE</p>	<p>STYLE 2: PIN 1. CATHODE 2., 4. ANODE 3. GATE</p>	<p>STYLE 3: PIN 1. BASE 2., 4. COLLECTOR 3. EMITTER</p>	<p>STYLE 4: PIN 1. ANODE 1 2., 4. ANODE 2 3. GATE</p>	<p>STYLE 5: PIN 1. MT 1 2., 4. MT 2 3. GATE</p>
<p>STYLE 6: PIN 1. CATHODE 2., 4. GATE 3. ANODE</p>	<p>STYLE 7: PIN 1. MT 1 2., 4. GATE 3. MT 2</p>	<p>STYLE 8: PIN 1. SOURCE 2., 4. GATE 3. DRAIN</p>	<p>STYLE 9: PIN 1. GATE 2., 4. DRAIN 3. SOURCE</p>	<p>STYLE 10: PIN 1. SOURCE 2., 4. DRAIN 3. GATE</p>

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