2N5655 2N5656 2N5657 (SILICON)
MJE5655 MJE5656 MJE5657

PLASTIC NPN SILICON HIGH-VOLTAGE POWER TRANSISTORS

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

- Excellent DC Current Gain – h_{FE} = 30-250 @ I_C = 100 mAdc
- Current-Gain – Bandwidth Product – f_T = 10 MHz (Min) @ I_C = 50 mAdc
- Packaged in Thermopad Case for Low Cost
- Choice of Packages – 2N5655, 2N5656, 2N5657 – Case 77
  MJE5655, MJE5656, MJE5657 – Case 199

0.5 AMPERE POWER TRANSISTORS
NPN SILICON
250-300-350 VOLTS
20 and 30 WATTS

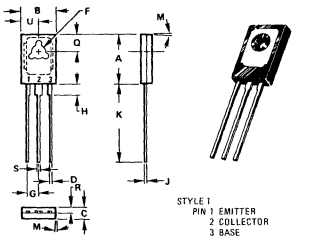
*MAXIMUM RATINGS

Rating	Symbol	2N5655 MJE5655	2N5656 MJE5656	2N5657 MJE5657	Unit
Collector-Emitter Voltage	V_{CEO}	250	300	350	Vdc
Collector-Base Voltage	V_{CB}	275	325	375	Vdc
Emitter-Base Voltage	V_{EB}	← 6.0 →			Vdc
Collector Current – Continuous	I_C	← 0.5 →			Adc
Peak		← 1.0 →			
Base Current	I_B	← 0.25 →			Adc
		2N5655 Series	MJE5655 Series		
Total Device Dissipation @ T_C=25°C	P_D	20	30		Watts
Derate above 25°C		0.16	0.24		W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150			°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	2N5655 Series	MJE5655 Series	Unit
Thermal Resistance, Junction to Case	θ_{JC}	6.25	4.167	°C/W

*Indicates JEDEC Registered Data for 2N5655 Series.



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	10.80	11.05	0.425	0.435
B	7.49	7.75	0.295	0.305
C	2.41	2.67	0.095	0.105
D	0.51	0.66	0.020	0.026
F	2.92	3.00	0.115	0.118
G	2.36 BSC		0.093 BSC	
H	2.16	2.41	0.085	0.095
J	0.38	0.64	0.015	0.025
K	15.38	16.64	0.605	0.655
M	3° TYP		3° TYP	
Q	3.76	4.01	0.148	0.158
R	1.14	1.40	0.045	0.055
S	0.64	0.89	0.025	0.035
U	3.68	3.94	0.145	0.155

2N5655
2N5656
2N5657

CASE 77-03

FIGURE 1 – POWER DERATING

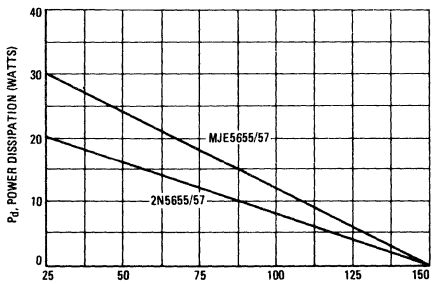
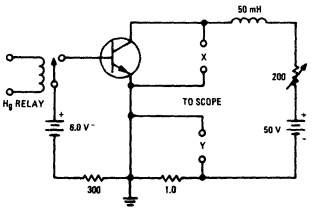
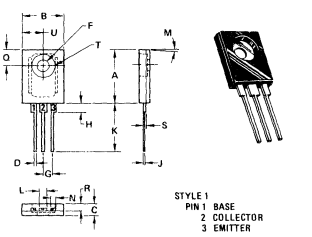


FIGURE 2 – SUSTAINING VOLTAGE TEST CIRCUIT





DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	16.08	16.33	0.633	0.643
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	0.51	0.76	0.020	0.030
F	3.61	3.86	0.142	0.152
G	2.54 BSC		0.100 BSC	
H	2.67	2.92	0.105	0.115
J	0.43	0.69	0.017	0.027
K	14.73	14.99	0.580	0.590
L	2.16	2.41	0.085	0.095
M	3° TYP		3° TYP	
N	1.47	1.73	0.058	0.068
Q	4.76	5.03	0.188	0.198
R	1.91	2.16	0.075	0.085
S	0.81	0.86	0.032	0.034
T	6.99	7.24	0.275	0.285
U	6.22	6.48	0.245	0.255

MJE5655
MJE5656
MJE5657

CASE 199-04

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

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (I_C = 100 mAdc (inductive), L = 50 mH)	2N5655, MJE5655	$V_{CEO(sus)}$	250	–	Vdc
	2N5656, MJE5656		300	–	
	2N5657, MJE5657		350	–	
Collector-Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	2N5655, MJE5655	BV_{CEO}	250	–	Vdc
	2N5656, MJE5656		300	–	
	2N5657, MJE5657		350	–	
Collector Cutoff Current		I_{CEO}			mAdc
(V_{CE} = 150 Vdc, I_B = 0)	2N5655, MJE5655		–	0.1	
(V_{CE} = 200 Vdc, I_B = 0)	2N5656, MJE5656		–	0.1	
(V_{CE} = 250 Vdc, I_B = 0)	2N5657, MJE5657		–	0.1	
Collector Cutoff Current		I_{CEX}			mAdc
(V_{CE} = 250 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	2N5655, MJE5655		–	0.1	
(V_{CE} = 300 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	2N5656, MJE5656		–	0.1	
(V_{CE} = 350 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	2N5657, MJE5657		–	0.1	
(V_{CE} = 150 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 100°C)	2N5655, MJE5655		–	1.0	
(V_{CE} = 200 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 100°C)	2N5656, MJE5656		–	1.0	
(V_{CE} = 250 Vdc, $V_{EB(off)}$ = 1.5 Vdc, T_C = 100°C)	2N5657, MJE5657		–	1.0	
Collector Cutoff Current		I_{CBO}			μAdc
(V_{CB} = 275 Vdc, I_E = 0)	2N5655, MJE5655		–	10	
(V_{CB} = 325 Vdc, I_E = 0)	2N5656, MJE5656		–	10	
(V_{CB} = 375 Vdc, I_E = 0)	2N5657, MJE5657		–	10	
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)		I_{EBO}		10	μAdc
ON CHARACTERISTICS					
DC Current Gain (1)		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 (1)		$V_{CE(sat)}$			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 (1) (I_C = 100 mAdc, V_{CE} = 10 Vdc)		V_{BE}	–	1.0	Vdc
DYNAMIC CHARACTERISTICS					
Current-Gain—Bandwidth Product (2) (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 10 MHz)		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	–	–

*Indicates JEDEC Registered Data for 2N5655 Series

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

(2) f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity

ACTIVE-REGION SAFE OPERATING AREA

FIGURE 3 – 2N5655, 2N5656, 2N5657

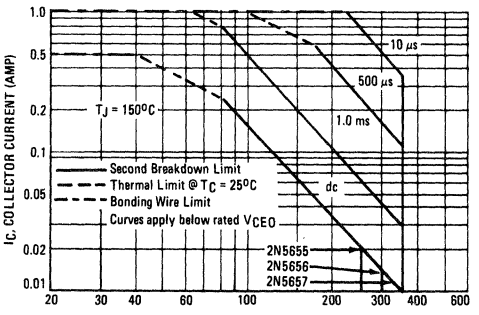
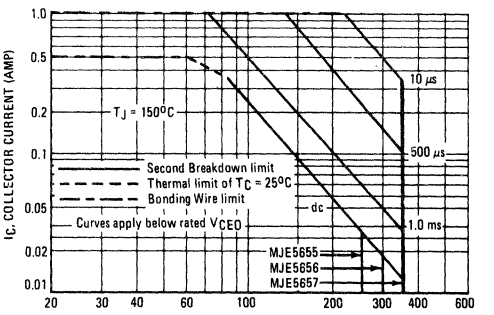


FIGURE 4 – MJE5655, MJE5656, MJE5657



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 Figures 3 and 4 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. (See AN-415)

LARGE SIGNAL CHARACTERISTICS

FIGURE 5 – TRANSCONDUCTANCE

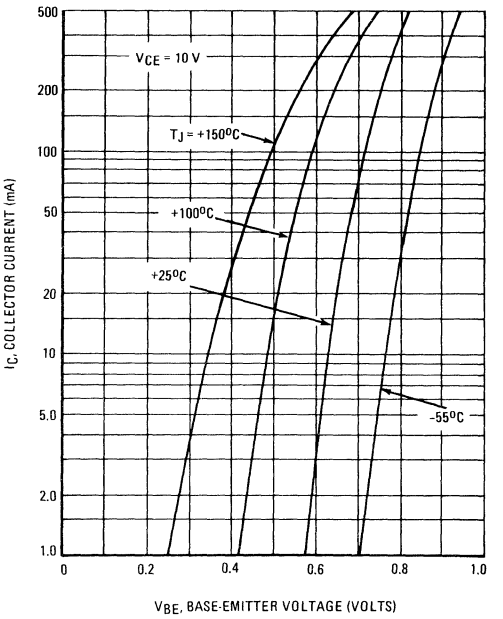
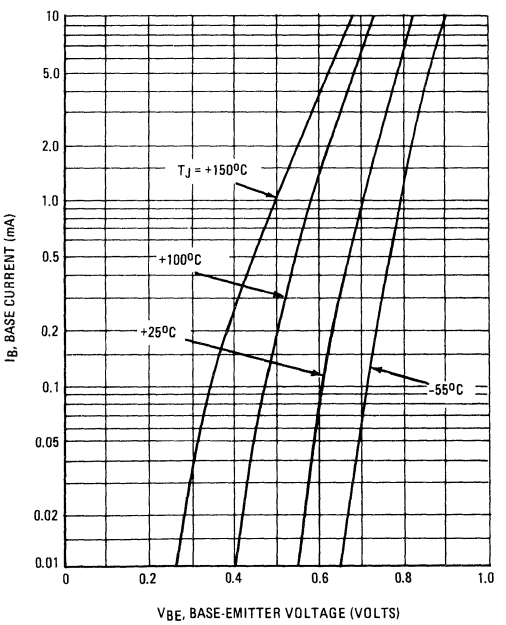


FIGURE 7 – INPUT ADMITTANCE



CUT-OFF CHARACTERISTICS

FIGURE 6 – TRANSCONDUCTANCE

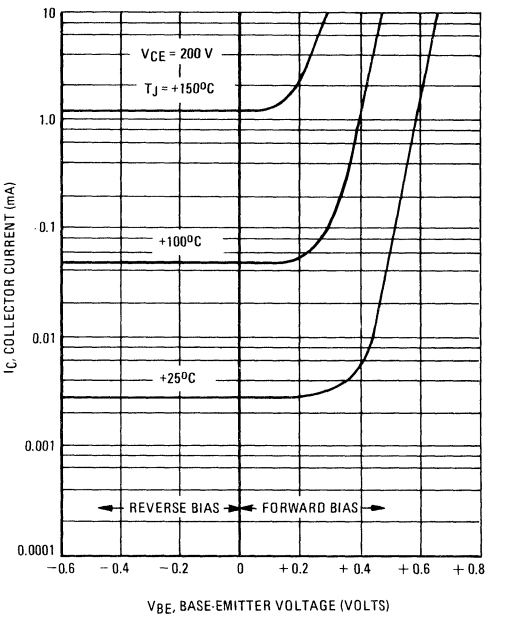


FIGURE 8 – EFFECT OF BASE-EMITTER RESISTANCE

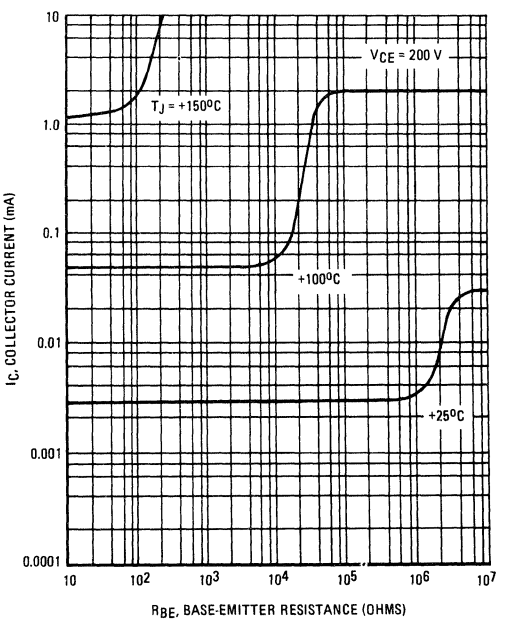


FIGURE 9 – CURRENT GAIN

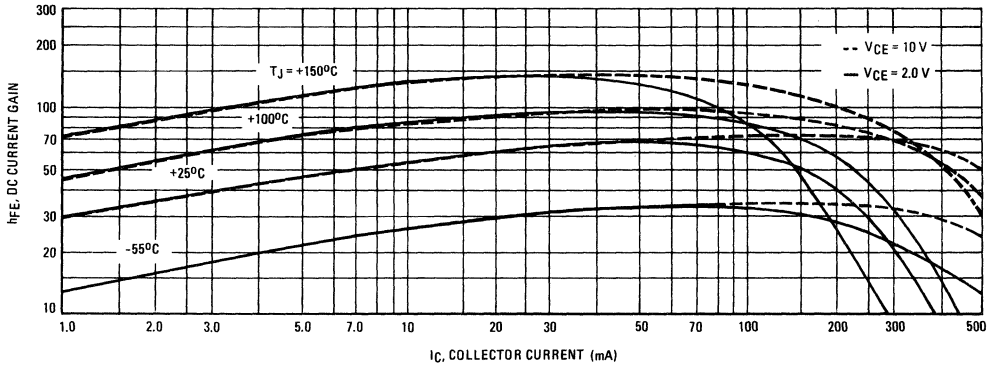


FIGURE 10 – "ON" VOLTAGES

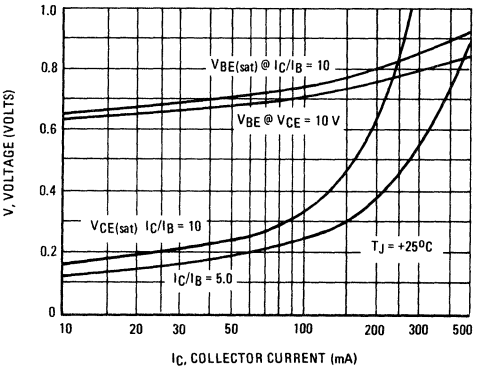


FIGURE 11 – CAPACITANCE

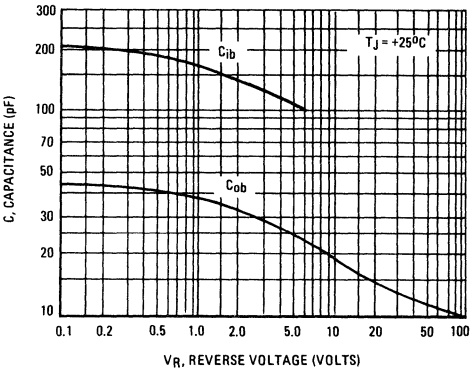


FIGURE 12 – TURN-ON TIME

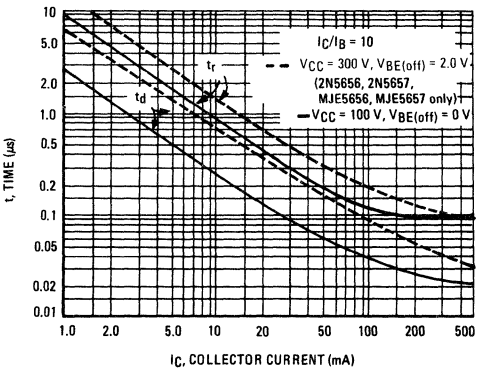


FIGURE 13 – TURN-OFF TIME