P-N-P SINGLE-DIFFUSED MESA SILICON POWER TRANSISTO

VER TRANSISTORS

TING AREAS

MAXIMUM COLLECTOR CURRENT
vs
UNCLAMPED INDUCTIVE LOAD

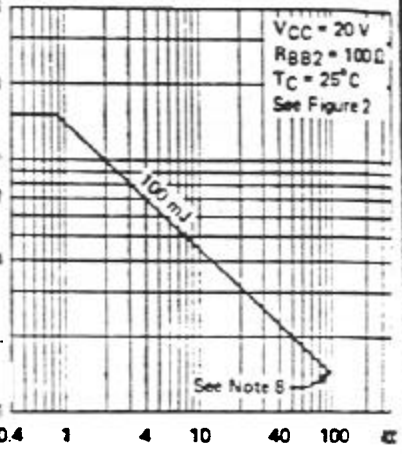

FIGURE 8

ION

FREE-AIR TEMPERATURE
DISSIPATION DERATING CURVE

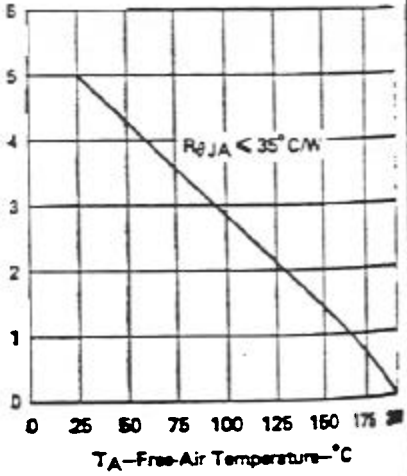

FIGURE 10

FOR POWER AMPLIFIER AND HIGH-SPEED SWITCHING APPLICATIONS
RECOMMENDED FOR COMPLEMENTARY USE WITH TIP3055

- 90 Watts at 25°C Case Temperature
- 15 A Rated Collector Current
- 62.5 mJ Reverse Energy Rating

echanical data

THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

bsolute maximum ratings at 25°C case temperature (unless otherwise noted)

Collector-Base Voltage	−100 V
Collector-Emitter Voltage (See Note 1)	−70 V
Emitter-Base Voltage	−7 V
Continuous Collector Current	−15 A
Continuous Base Current	−7 A
Safe Operating Region at (or below) 25°C Case Temperature	See Figure 5
Continuous Device Dissipation at (or below) 25°C Case Temperature (See Note 2)	90 W
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 3)	3.5 W
Unclamped Inductive Load Energy (See Note 4)	62.5 mJ
Operating Collector Junction Temperature Range	−65°C to 150°C
Storage Temperature Range	−65°C to 150°C
Lead Temperature 1/8 Inch from Case For 10 Seconds	260°C

NOTES 1. This value applies when the base-emitter resistance R_{BE} = 100 Ω.
2. Derate linearly to 150°C case temperature at the rate of 0.72 W/°C.
3. Derate linearly to 150°C free-air temperature at the rate of 28 mW/°C.
4. This rating is based on the capability of the transistor to operate safely in the circuit of Figure 2. L = 20 mH, R_{BB2} = 100 Ω, V_{BB2} = 0 V, R_S = 0.1 Ω, V_{CC} = 10 V. Energy = $I_C^2L/2$.

TYPE TIP2955
P-N-P SINGLE-DIFFUSED MESA SILICON POWER TRANSISTOR

electrical characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS			MIN	MAX	UNIT
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = −30 mA,	I_B = 0,	See Note 5	−60		V
I_{CER}	Collector Cutoff Current	V_{CE} = −70 V,	R_{BE} = 100 Ω			−1	mA
I_{CEO}	Collector Cutoff Current	V_{CE} = −30 V,	I_B = 0			−0.7	mA
I_{CEV}	Collector Cutoff Current	V_{CE} = −100 V,	V_{BE} = 1.5 V			−1	mA
I_{EBO}	Emitter Cutoff Current	V_{EB} = −7 V,	I_C = 0			−1	mA
h_{FE}	Static Forward Current Transfer Ratio	V_{CE} = −4 V,	I_C = −4 A,	See Notes 5 and 6	20	70	
		V_{CE} = −4 V,	I_C = −10 A,	See Notes 5 and 6	5		
V_{BE}	Base-Emitter Voltage	V_{CE} = −4 V,	I_C = −4 A,	See Notes 5 and 6		−1.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_B = −400 mA,	I_C = −4 A,	See Notes 5 and 6		−1.1	V
		I_B = −3.3 A,	I_C = −10 A,	See Notes 5 and 6		−4	V
h_{fe}	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = −4 V,	I_C = −1 A,	f = 1 kHz	15		
f_{hfe}	Small-Signal Common-Emitter Forward Current Transfer Ratio Cutoff Frequency	V_{CE} = −4 V,	I_C = −1 A,	See Note 7	10		MHz

NOTES 5. These parameters must be measured using pulse techniques. t_w = 300 μs, duty cycle ≤ 2%.

6. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 0.125 inch from the device body.

7. f_{hfe} is the frequency at which the magnitude of the small-signal forward current transfer ratio is 0.707 of its low-frequency value. For this device, the reference measurement is made at 1 kHz.

thermal characteristics

PARAMETER		MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance	1.39	°C/W
$R_{\theta JA}$	Junction-to-Free-Air Thermal Resistance	35.7	

switching characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS†			TYP	UNIT
t_{on}	Turn-On Time	I_C = −6 A,	$I_{B(1)}$ = −0.6 A,	$I_{B(2)}$ = 0.6 A,	0.4	μs
t_{off}	Turn-Off Time	$V_{BE(off)}$ = 4 V,	R_L = 5 Ω,	See Figure 1	0.7	

†Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

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TRANSISTOR

	CONDITIONS		MIN	MAX	UNIT
	0,	See Note 5	−60		V
	= 100 Ω			−1	mA
	0			−0.7	mA
BE	= 1.5 V			−5	mA
	= 0			−5	mA
	−4 A,	See Notes 5 and 6	20	70	
	−10 A,	See Notes 5 and 6	5		
	−4 A,	See Notes 5 and 6		−1.8	V
	−4 A,	See Notes 5 and 6		−1.1	V
	−10 A,	See Notes 5 and 6		−3	
	−1 A,	f = 1 kHz	15		
	= −1 A,	See Note 7	10		kHz

rcle ≤ 2%
e current-carrying contacts and located within 0.125

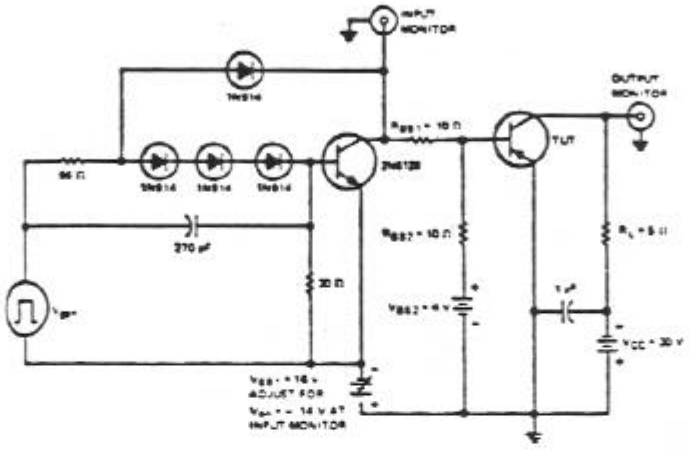
nt transfer ratio is 0.707 of its low-frequency value

	MAX	UNIT
	1.39	°C/W
	35.7	

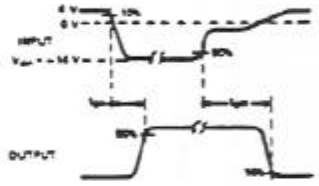
CONDITIONS†		TYP	UNIT
= −0.6 A,	$I_{B(2)}$ = 0.6 A,	0.4	μs
= 5 Ω,	See Figure 1	0.7	

†Otherwise

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

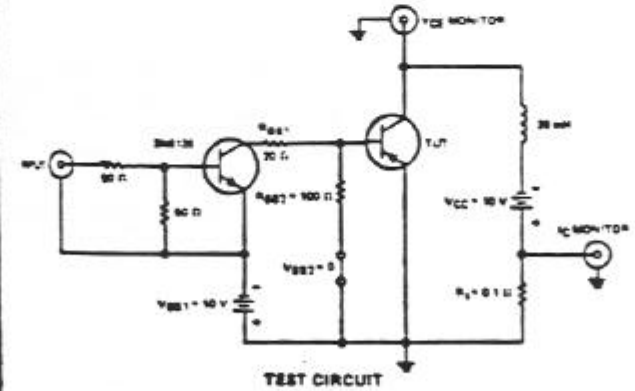


VOLTAGE WAVEFORMS

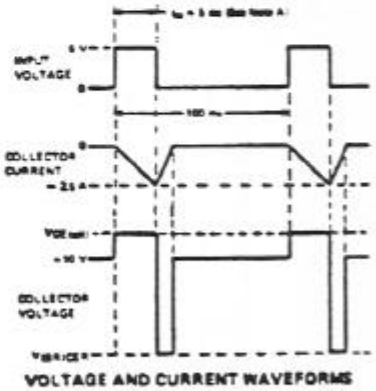
NOTES
A. V_{gen} is a 30-V pulse (from 0 V) into a 50-Ω termination.
B. The V_{gen} waveform is supplied by a generator with the following characteristics: t_r ≤ 15 ns, t_f ≤ 15 ns, Z_{out} = 50 Ω, t_w = 20 μs, duty cycle ≤ 2%.
C. Waveforms are monitored on an oscilloscope with the following characteristics: t_r ≤ 15 ns, R_{in} ≥ 10 MΩ, C_{in} ≤ 11.8 pF.
D. Resistors must be noninductive types.
E. The d-c power supplies may require additional bypassing in order to minimize ringing.

FIGURE 1

INDUCTIVE LOAD SWITCHING



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTE A. Input pulse width is increased until I_{CM} = −2.5 A.

FIGURE 2

TYPE TIP2955
P-N-P SINGLE-DIFFUSED MESA SILICON POWER TRANSISTOR

TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

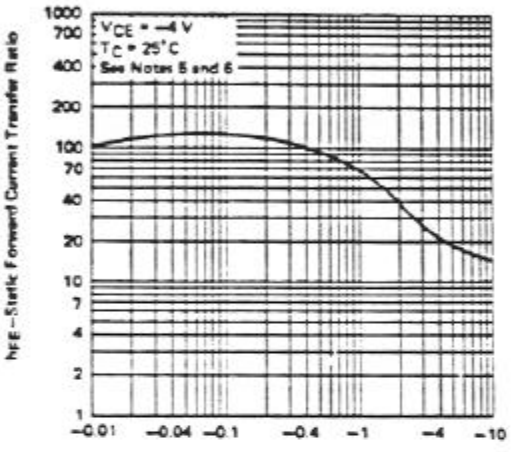


FIGURE 3

NOTES 5. These parameters must be measured using pulse techniques, t_w = 300 μs, duty cycle < 2%.
6. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 0.125 inch from the device body.

THERMAL INFORMATION

DISSIPATION DERATING CURVE

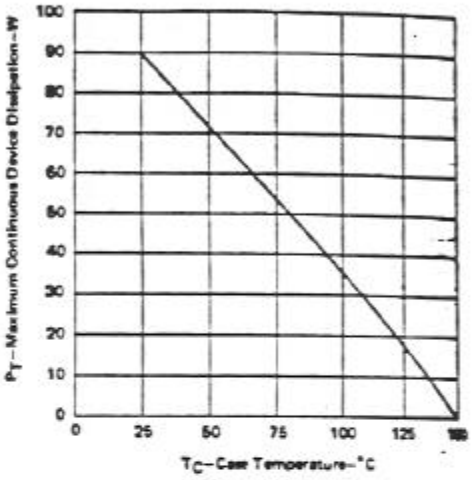


FIGURE 4

MAXIMUM SAFE OPERATING REGION

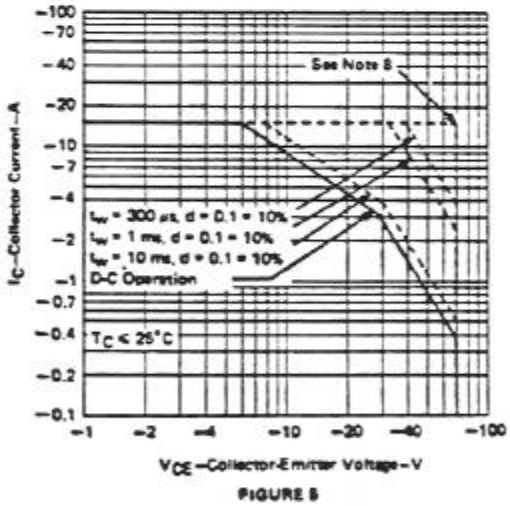


FIGURE 5

NOTE 8. This combination of maximum voltage and current may be achieved only when switching from saturation to cutoff with a clamped inductive load

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