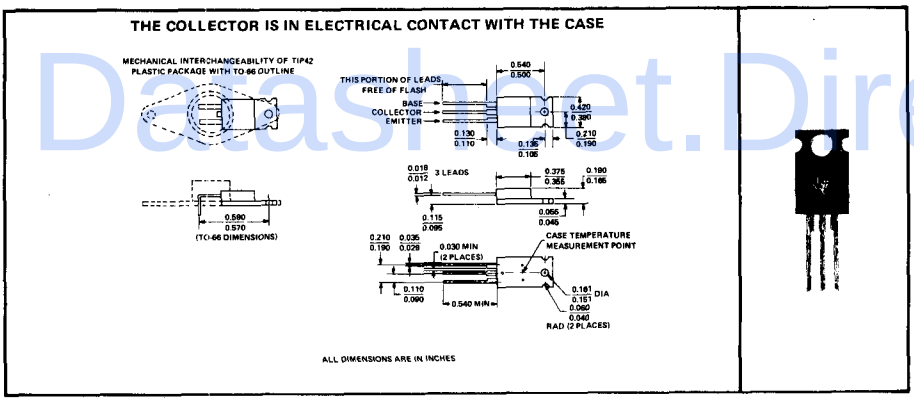
FOR POWER-AMPLIFIER AND HIGH-SPEED-SWITCHING APPLICATIONS
DESIGNED FOR COMPLEMENTARY USE WITH TIP41, TIP41A, TIP41B, TIP41C

- 65 W at 25°C Case Temperature
- 6 A Rated Collector Current
- Min f_T of 3 MHz at 10 V, 500 mA

mechanical data



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

	TIP42	TIP42A	TIP42B	TIP42C
Collector-Base Voltage	−40 V	−60 V	−80 V	−100 V
Collector-Emitter Voltage (See Note 1)	−40 V	−60 V	−80 V	−100 V
Emitter-Base Voltage	← −5 V →			
Continuous Collector Current	← −6 A →			
Peak Collector Current (See Note 2)	← −10 A →			
Continuous Base Current	← −3 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 3)	← 65 W →			
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 4)	← 2 W →			
Unclamped Inductive Load Energy (See Note 5)	← 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 diode is open-circuited.
2. This value applies for $t_w \leq 0.3$ ms, duty cycle $\leq 10\%$.
3. Derate linearly to 150°C case temperature at the rate of 0.52 W/°C.
4. Derate linearly to 150°C free-air temperature at the rate of 16 mW/°C.
5. 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 ≈ $I_C^2 L/2$.

electrical characteristics at 25°C case temperature

PARAMETER		TEST CONDITIONS	TIP42		TIP42A		TIP42B		TIP42C		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = −30 mA, I_B = 0, See Note 6	−40		−60		−80		−100		V
I_{CEO}	Collector Cutoff Current	V_{CE} = −30 V, I_B = 0		−0.7		−0.7					mA
		V_{CE} = −60 V, I_B = 0						−0.7		−0.7	
I_{CES}	Collector Cutoff Current	V_{CE} = −40 V, V_{BE} = 0		−0.4							mA
		V_{CE} = −60 V, V_{BE} = 0				−0.4					
		V_{CE} = −80 V, V_{BE} = 0						−0.4			
		V_{CE} = −100 V, V_{BE} = 0								−0.4	
I_{EBO}	Emitter Cutoff Current	V_{EB} = −5 V, I_C = 0		−1		−1		−1		−1	mA
h_{FE}	Static Forward Current Transfer Ratio	V_{CE} = −4 V, I_C = −0.3 A, See Notes 6 and 7	30		30		30		30		
		V_{CE} = −4 V, I_C = −3 A, See Notes 6 and 7	15	75	15	75	15	75	15	75	
V_{BE}	Base-Emitter Voltage	V_{CE} = −4 V, I_C = −6 A, See Notes 6 and 7		−2		−2		−2		−2	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_B = −0.6 A, I_C = −6 A, See Notes 6 and 7		−1.5		−1.5		−1.5		−1.5	V
h_{fe}	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = −10 V, I_C = −0.5 A, f = 1 kHz	20		20		20		20		
$\|h_{fe}\|$	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = −10 V, I_C = −0.5 A, f = 1 MHz	3		3		3		3		

NOTES: 6. These parameters must be measured using pulse techniques. t_w = 300 μs, duty cycle ≤ 2%.
7. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts.

thermal characteristics

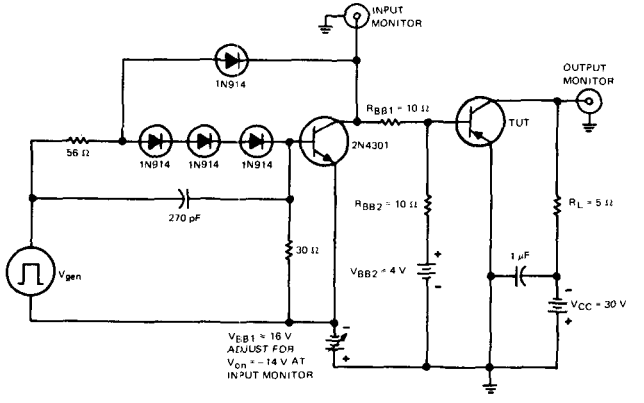
PARAMETER		MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance	1.92	°C/W
$R_{\theta JA}$	Junction-to-Free-Air Thermal Resistance	62.5	

switching characteristics at 25°C case temperature

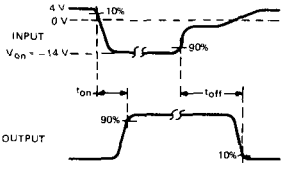
PARAMETER		TEST CONDITIONS†			TYP	UNIT
t_{on}	Turn-On Time	I_C = −6 A,	$I_{B(1)}$ = −0.6 A,	$I_{B(2)}$ = 0.6 A,	0.4	μs
t_{off}	Turn-Off Time	$V_{BE(off)}$ = 4 V,	R_L = 5 Ω,	See Figure 1	0.7	

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

PARAMETER MEASUREMENT INFORMATION



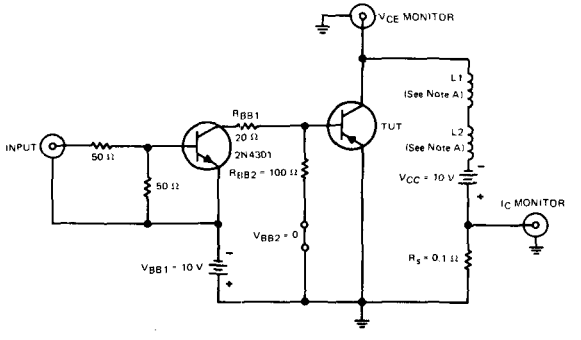
TEST CIRCUIT



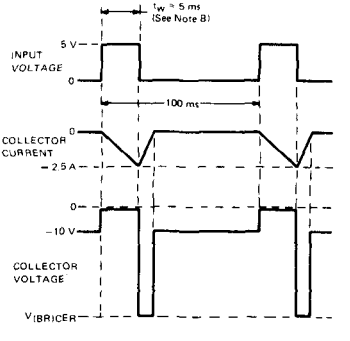
VOLTAGE WAVEFORMS

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: $t_r \leq 15$ ns, $t_f \leq 15$ ns, $Z_{out} = 50\ \Omega$, $t_w = 20\ \mu s$, duty cycle ≤ 2%.
C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10\ M\Omega$, $C_{in} \leq 11.5$ pF.
D. Resistors must be noninductive types.
E. The d-c power supplies may require additional bypassing in order to minimize ringing.

INDUCTIVE LOAD SWITCHING



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTES: A. L1 and L2 are 10 mH, 0.11 Ω, Chicago Standard Transformer Corporation C-2688, or equivalent.
B. Input pulse width is increased until $I_{CM} = -2.5$ A.

FIGURE 2

TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

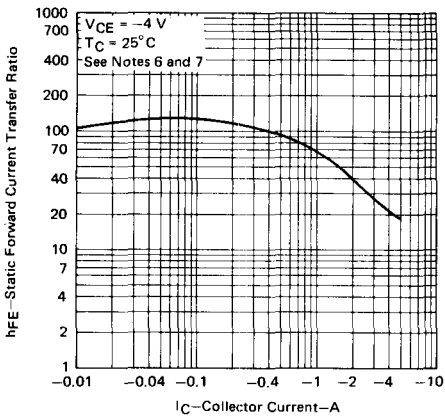


FIGURE 3

NOTES: 6. These parameters must be measured using pulse techniques. t_w = 300 μs, duty cycle ≤ 2%.
7. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts.

THERMAL INFORMATION

DISSIPATION DERATING CURVE

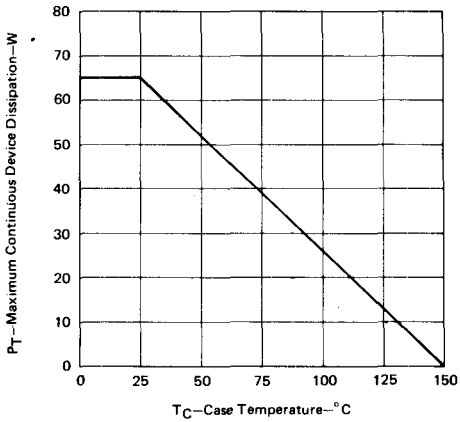


FIGURE 4

MAXIMUM SAFE OPERATING REGION

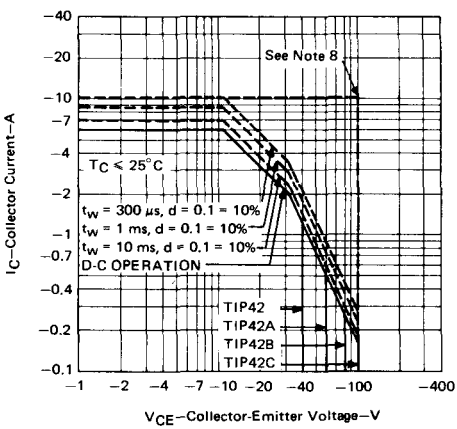


FIGURE 5

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

Typ type NPN	PNP	P_{tot} @ T_C = 25 °C (100 °C) W	V_{CEO} min	I_{CD} max A	min	h_{FE} max	@ I_C A
TIP 35 B	TIP 36 B	90	80	25	25	100	1,5
TIP 35 C	TIP 36 C	90	100	25	25	100	1,5
TIP 41	TIP 42	65	40	6	15	75	3
TIP 41 A	TIP 42 A	65	60	6	15	75	3
TIP 41 B	TIP 42 B	65	80	6	15	75	3
TIP 41 C	TIP 42 C	65	100	6	15	75	3
TIP 3055	TIP 5530	90	70	15	20		4
BD 633	BD 634	30	45	2	25		1
BD 635	BD 636	30	60	2	25		1
BD 637	BD 638	30	80	2	25		1
BD 733	BD 734	40	32	4	50		2
BD 735	BD 736	40	32	4	50		2
BD 737	BD738	40	45	4	40		2
TIP 110	TIP 115	50	60	2	1000		1
TIP 111	TIP 116	50	80	2	1000		1
TIP 112	TIP 117	50	100	2	1000		1
TIP 120	TIP 125	65	60	5	1000		3
TIP 121	TIP 126	65	80	5	1000		3
TIP 122	TIP 127	65	100	5	1000		3
TIP 140	TIP 145	125	60	10	1000		5
TIP 141	TIP 146	125	80	10	1000		5
TIP 142	TIP 147	125	100	10	1000		5

Typ type	P_{tot} @ T_A = 25 °C (100 °C) W	T_C = 25 °C (100 °C) W	V_{CEO} min V	I_{CD} max A	min	h_{FE} max	@ I_C A
2N 4915	4	87,5	80	5	25	100	2,5
2N 4998	2	(20)	80	2	30	90	1
2N 5000	2	(20)	80	2	70	200	1
2N 5002		(33,3)	80	5	30	90	2,5
2N 5004		(33,3)	80	5	70	200	2,5
2N 5038	5	140	90	20	20	100	12
2N 5039	5	140	75	20	20	100	10
2N 5148	1	(4)	80	2	30	90	1
2N 5150	1	(4)	80	2	70	200	1
2N 5152		(6,7)	80	2	30	90	2,5
2N 5154		(6,7)	80	2	70	200	2,5
2N 5301	5	200	40	20	40	60	1
2N 5302	5	200	60	20	40	60	1
2N 5303	5	200	80	20	40	60	1

f_T min MHz	I_{CES} @ (I_{CEO}) µA	V_{CE} V	Gehäuse package	Anwendungen applications, remarks
3	700	80	TO-3P	Verstärker, Schalter, komplementär zu TIP 36 B amplifier, switch, complementary to TIP 36 B
3	700	100	TO-66P	Verstärker, Schalter, komplementär zu TIP 36 C amplifier, switch, complementary to TIP 36 C
3	400	40	TO-66P	Verstärker, Schalter, komplementär zu TIP 42 amplifier, switch, complementary to TIP 42
3	400	60	TO-66P	Verstärker, Schalter, komplementär zu TIP 42 A amplifier, switch, complementary to TIP 42 A
3	400	80	TO-66P	Verstärker, Schalter, komplementär zu TIP 42 B amplifier, switch, complementary to TIP 42 B
3	400	100	TO-66P	Verstärker, Schalter, komplementär zu TIP 42 C amplifier, switch, complementary to TIP 42 C
			TO-3P	
			TO-66 TO-66 TO-66	Komplementär Endstufen for complementary output stages
			TO-66 TO-66 TO-66	
			TO-66P TO-66P TO-66P	Darlington
			TO-66P TO-66P TO-66P	Verstärker, Schalter Darlington amplifier, switch
			TO-3P TO-3P TO-3P	Darlington

f_T min MHz	I_{CES} @ (I_{CEO}) µA	V_{VE} V	Gehäuse package	Anwendungen, Bemerkungen applications, remarks
4	(1000)	80	TO-3	Verstärker, Schalter amplifier, switch
50	(0,05)	40	TO-59	Für Computeranwendung
60	(0,05)	40	TO-59	komplementär zu 2N 4999, 2N 5001, 2N 5003, 2N 5005
60	(0,05)	40	TO-59	computer application
70	(0,05)	40	TO-59	complementary to 2N 4999, 2N 5001, 2N 5003, 2N 5005
60	50	140	TO-3	Verstärker und schnelle Schalter
60	50	110	TO-3	amplifier and high-speed switch
50	(0,05)	40	TO-39	Für Computeranwendung
60	(0,05)	40	TO-39	komplementär zu 2N 5147, 2N 5149, 2N 5151, 2N 5153
60	(0,05)	40	TO-39	computer application
70	(0,05)	40	TO-39	complementary to 2N 5147, 2N 5149, 2N 5151, 2N 5153
4	(5)	40	TO-3	Verstärker, Schalter
4	(5)	60	TO-3	amplifier, switch
4	(5)	80	TO-3	