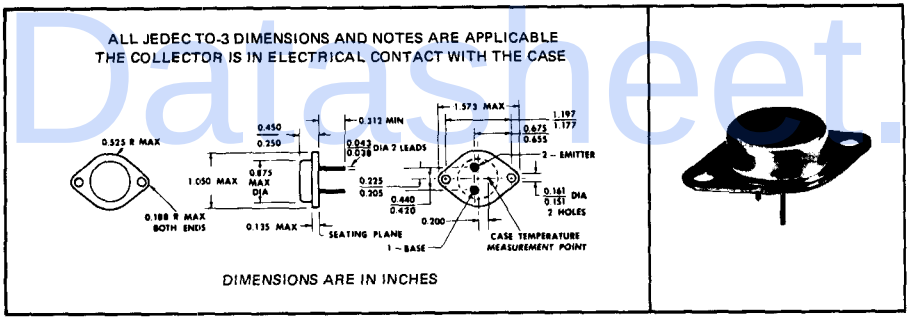
HIGH VOLTAGE, HIGH FORWARD AND REVERSE ENERGY DESIGNED FOR INDUSTRIAL AND MILITARY APPLICATIONS

- 100 W at 75°C Case Temperature
- 700 V Collector-Emitter Off-State Voltage
- Min $V_{(BR)CEO}$ of 400 V
- Max t_{off} of 1.7 μs at I_C = 1 A
- Typ $V_{CE(sat)}$ of 0.3 V at I_C = 3.5 A
- Typ f_T of 5 MHz at 12 V, 0.2 A

*mechanical data



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

*Collector-Emitter Voltage (V_{BE} = −1.5 V, See Note 1)	700 V
*Collector-Emitter Voltage (Base Open, See Note 1)	500 V
*Emitter-Base Voltage	6 V
*Continuous Collector Current	3.5 A
*Continuous Base Current	2 A
Safe Operating Area at (or below) 75°C Case Temperature	See Figure 6
*Continuous Device Dissipation at (or below) 75°C Case Temperature (See Note 2)	100 W
Continuous Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 3)	4 W
Unclamped Inductive Load Energy (See Note 4)	180 mJ
*Operating Collector Junction Temperature Range	−65°C to 150°C
*Storage Temperature Range	−65°C to 200°C
*Terminal Temperature 1/16 Inch from Case for 10 Seconds	300°C

NOTES: 1. These values apply only when the collector-emitter voltage is applied with the transistor in the off-state with the base-emitter diode reverse-biased or open-circuited, as specified. In operation, the limitations of Figure 6 must be observed.
2. Derate linearly to 150°C case temperature at the rate of 1.33 W/°C.
3. Derate linearly to 150°C free-air temperature at the rate of 32 mW/°C.
4. This rating is based on the capability of the transistor to operate safely in the circuit of Figure 2, condition 1. L = 40 mH, R_{BB2} = 3 kΩ, V_{BB2} = 1.5 V, R_S = 0.1 Ω, V_{CC} = 50 V. Energy ≈ $I_C^2 L/2$.

*JEDEC registered data. This data sheet contains all applicable registered data in effect at the time of publication.

*electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	I_C = 100 mA, I_B = 0,	See Note 5		400			V
$V_{(BR)CER}$	Collector-Emitter Breakdown Voltage	I_{CM} = 3.5 A, R_{BE} = 10 Ω,	See Figure 2 (Condition 2)		500			V
I_{CEO}	Collector Cutoff Current	V_{CE} = 500 V, I_B = 0					0.25	mA
I_{CEV}	Collector Cutoff Current	V_{CE} = 700 V, V_{BE} = −1.5 V					0.5	mA
		V_{CE} = 400 V, V_{BE} = −1.5 V, T_C = 125°C					0.5	
I_{EBO}	Emitter Cutoff Current	V_{EB} = 6 V, I_C = 0					5	mA
h_{FE}	Static Forward Current Transfer Ratio	V_{CE} = 5 V, I_C = 1 A		See Notes 5 and 6	30		90	
		V_{CE} = 5 V, I_C = 2.5 A			10			
		V_{CE} = 5 V, I_C = 1 A,	T_C = −55°C		10			
V_{BE}	Base-Emitter Voltage	I_B = 0.7 A, I_C = 3.5 A,		See Notes 5 and 6		1.1	2	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_B = 0.1 A, I_C = 1 A		See Notes 5 and 6		0.2	0.8	V
		I_B = 0.7 A, I_C = 3.5 A				0.3	2.5	
$\lvert h_{fe} \rvert$	Small-Signal Common-Emitter Forward Current Transfer Ratio	V_{CE} = 12 V, I_C = 0.2 A,	f = 1 MHz		2.8	5		
C_{obo}	Common-Base Open-Circuit Output Capacitance	V_{CB} = 20 V, I_E = 0,	f = 1 MHz			100	150	pF

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 characteristics

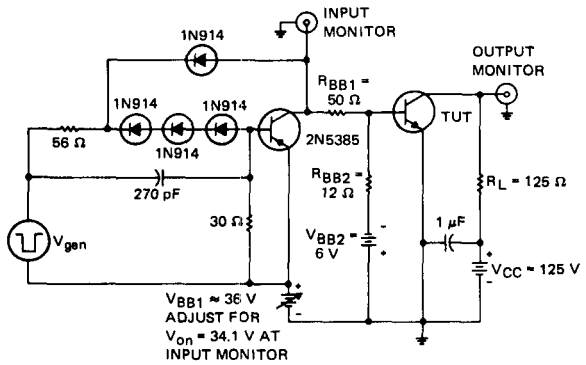
PARAMETER		MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance	0.75	°C/W
$R_{\theta JA}$	Junction-to-Free-Air Thermal Resistance	31.25	

*switching characteristics at 25°C case temperature

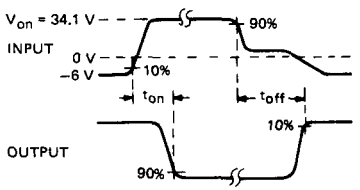
PARAMETER		TEST CONDITIONS†	MAX	UNIT
t_{on}	Turn-On Time	I_C = 1 A, $I_{B(1)}$ = 0.1 A, $I_{B(2)}$ = −0.5 A,	0.8	μs
t_{off}	Turn-Off Time	$V_{BE(off)}$ = −6 V, R_L = 125 Ω, See Figure 1	1.7	

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

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

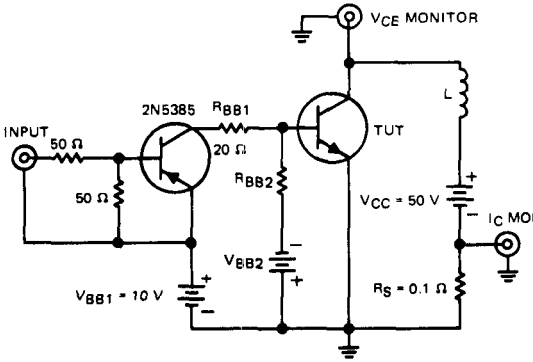


VOLTAGE WAVEFORMS

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 Ω t_w = 5 μs, duty cycle ≤ 5%.
C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 10$ ns, $R_{in} \geq 1$ MΩ, $C_{in} \leq 11.5$ pF.
D. Resistors must be noninductive types.
E. The d-c power supplies may require additional bypassing in order to minimize ringing.

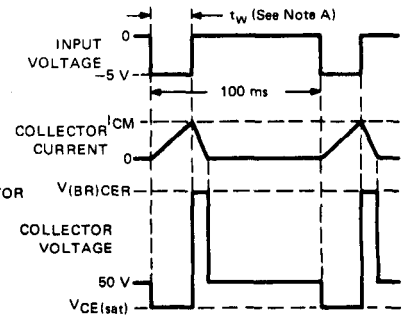
FIGURE 1

INDUCTIVE LOAD SWITCHING



CONDITION	R_{BB2}	V_{BB2}	L	I_{CM}	t_w
1	3 kΩ	1.5 V	40 mH	3 A	≈ 2.4 ms
2	10 Ω	0 V	10 mH	3.5 A	≈ 0.7 ms

TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTE A: Input pulse width is increased until the peak collector current reaches the specified value of I_{CM}.

FIGURE 2

TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO vs COLLECTOR CURRENT

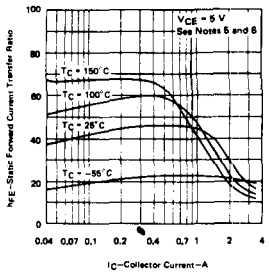


FIGURE 3

BASE-EMITTER VOLTAGE vs CASE TEMPERATURE

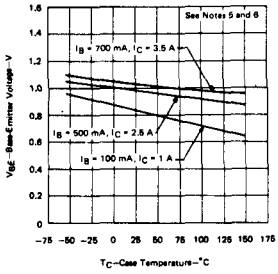


FIGURE 4

COLLECTOR-EMITTER SATURATION VOLTAGE vs CASE TEMPERATURE

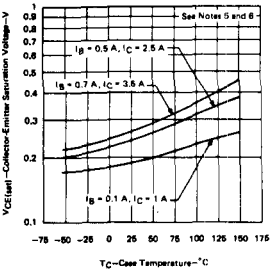


FIGURE 5

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.

MAXIMUM SAFE OPERATING AREA

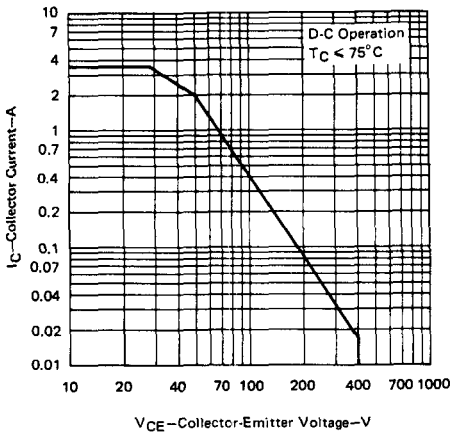


FIGURE 6

THERMAL INFORMATION

DISSIPATION DERATING CURVE

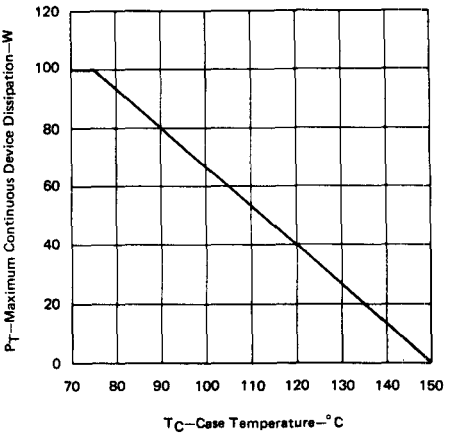


FIGURE 7

TEXAS INSTRUMENTS

Typ type	P_{tot} T_G = 25 °C (T_C = 100 °C) W		V_{CEO} min V	I_{CD} max A		h_{FE} @ min	I_C max A
BUY 70 A		75	1000*	10		15	1,0
BUY 70 B		75	800*	10		15	1,0
BUY 70 C		75	500*	10		15	1,0
BUY 71		40	2200*	2			
BDX 31		40	2200*	4			
BDX 32		40	1700*	4			
2N 3439	Siehe Datenblatt Seite 2-301;		See Data Sheet Page 2-301				
2N 3440	Siehe Datenblatt Seite 2-301;		See Data Sheet Page 2-301				
2N 3583	2	35	175	1	40	200	0,5
2N 3584	2	35	250	2	8	140	1
2N 3585	2	35	300	2	8	140	1
2N 3902	4	100	325	2,5	30	90	1
2N 4240	2	35	300	2	6	240	0,75
2N 5157	4	100	400	3,5	30	90	1
2N 5241	4	125	325	5	15	35	2,5
TIP 525	4	(60)	200	5	30	150	2,5
TIP 531	4	(150)	300	15	20	120	7,5
TIP 532	4	(150)	400	15	20	120	7,5
TIP 533	4	(150)	300	15	20	120	7,5
TIP 534	4	(150)	400	15	20	120	7,5
TIP 535	5	(100)	200	7,5	20	100	5
TIP 536	5	(100)	200	7,5	20	100	5
TIP 537	5	(100)	400	7,5	20	100	5
TIP 538	5	(125)	200	15	20	100	7,5
TIP 539	5	(125)	300	15	20	100	7,5
TIP 540	5	(125)	400	15	20	100	7,5

f_T min MHz	*I_{CEV} (I_{CEO}) I_{CES} @ mA	V_{CE} V	Gehäuse package	Anwendungen, Bemerkungen applications, remarks
	(1)	1000	TO-3	Für Schalteranwendungen
	(1)	800	TO-3	switching applications
	(1)	500	TO-3	
	1	2200	TO-3	Fernsehanwendung, Horizontal-Ablenkendstufen in Sw TV horizontal deflection black and white
	1	2200	TO-3	Fernsehanwendung, Horizontal-Ablenkendstufen in Farbgeräten
	1	1700	TO-3	Color TV horizontal deflection
10	1	225	TO-66	Für industrielle und militärische Anwendung
10	1	300	TO-66	for industrial and military application
10	1	400	TO-66	
5	0,25	400	TO-3	
15	2	400	TO-66	
2,8	0,5	700	TO-3	
2,5	0,5	400	TO-3	
40	1	250	TO-3	Verstärker, schneller Schalter amplifier, high-speed switch
50	1	300	TO-3	Verstärker, schnelle Schaltanwendung, Netzgeräte
50	1	400	TO-3	amplifier, switch, power supply
50	1	300	TO-3	
50	1	400	TO-3	
10	1	300	TO-3	
10	1	400	TO-3	
10	1	500	TO-3	
10	1	300	TO-3	
10	1	400	TO-3	
10	1	500	TO-3	